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Night View in a Knitting Mill Where Indirect General Lighting Eliminated Complaints About Glare from the Needles and Wiped Out High Labor Turnover.

# How Better Industrial Lighting Can Improve Working Conditions

## Working Conditions, Including Welfare of Employes, Can No Longer Be Ignored—Up-to-Date Lighting Makes Better Conditions and Reduces Labor Turnover and Labor Disputes

By F. H. BERNHARD

DURING the late war was witnessed one of the most splendid examples of national concentration of effort toward meeting a great emergency. With practical unanimity the country saw the need for greater production and proceeded to meet it by more intense and efficient application in all the industries except those non-essential to winning the war.

A different kind of emergency now confronts us. Continuance of high costs of the necessities of life is given as a primary cause of the serious industrial unrest so prevalent in our country as well as abroad. While there is some truth in this, it is not all the truth. Nevertheless, this unrest is a serious menace that threatens to further increase the cost of living. Instead of stimulating efficient production, which is doubtless the most effective remedy for high costs of products, it retards production. Clearly the situation calls for concerted efforts to fight the high costs and allay the unrest.

In an article published in these columns two weeks ago the writer undertook to show that improved industrial lighting can aid materially in stimulating production and thus help reduce the costs of commodities. In the present article an effort will be made to show that better lighting brings about substantial improvement in working conditions and thus affects production favorably while at the same time eliminat-

ing some of the causes for large labor turnover and possible labor disputes.

### Growing Importance of Attention to Working Conditions.

Any discussion of the value of some proposed improvement in working conditions usually takes for granted that a corresponding improvement in production must follow. This is not always true because the extremely variable human element enters. When we discuss improvement in the efficiency of employes, however, there is a directly proportional relation between efficiency and output, as was pointed out in the article referred to. Betterment of working conditions may in some cases cause more than a corresponding increase in output, while in others the increase may be considerably less than in direct ratio; the latter is especially true where some artificial restriction, such as that of a labor union, is placed upon the output. Thus when we consider workmen merely as productive agencies, like machines, we find their production obeys almost mathematical laws, while when we must take into account their desires, prejudices and frailties as human beings the relation between stimulus and result is no longer as direct. This is one of the reasons why employers have formerly not given as much attention to working conditions as they do now.

Effects of working conditions are of many kinds, depending upon what is covered by the term. One may distinguish at least four different kinds of working conditions: (1) Those associated with the industry, trade or operation considered and determined by the standards developed with the progress of the art. (2) Physical conditions and environment of the plant, outside and inside; the latter includes daylight and artificial lighting conditions, ventilation, heating, sanitary facilities, etc. (3) Conditions set by the management, such as wages, hours of work, superintendence, character of foremen, etc. (4) Conditions determined by workmen, such as character and nationality of fellow-employes, requirement of labor organization, etc. The aggregate of these various conditions determines the desirability of employment in any particular occupation and particular plant.

Great changes have taken place in the importance placed on working conditions during the last few decades. Formerly the workman took up the trade or occupation of his father to a much larger extent than now. He assumed as inherent to that trade the peculiar nature of its work and the hazards and joys, if any, associated with it. The employer determined the principal conditions of employment and there was little change from year to year.

Gradually, however, the employes have taken a more and more active part in saying what the conditions shall be. If these were not satisfactory, many would quit and go to plants where they were better. Shop committees presented requests for improvement; if these were not granted, definite organization and affiliation with labor unions often followed together with subsequent strikes.

Any unbiased person must admit that through the labor unions there have resulted extremely important improvements in working conditions, the net result of which has been a marked raising of the standard of living of the great mass of our population. He must also admit that, in the last few years especially, many of the leaders of the unions have seemingly lost their heads and have presented demands beyond all reason, backing them up by provoking unwarranted strikes that constitute a very serious economic loss to the country and, if not checked, may become a grave menace to the nation. The president of the National Association of Manufacturers has just stated that during the last eight months strikes and threatened strikes have cost our country an average of about $10,000,000 a day—an outright and needless loss in wages and business. Under such conditions no manufacturer can afford to ignore giving close attention to the working conditions in his plant, any one of which may become the seed for the growth of discontent and thus lead to disputes and stoppage of work.

In presenting the following discussion of the several ways in which up-to-date lighting can improve working conditions, it is fully recognized that it is not a panacea in this regard. In fact, there is no single panacea; high wages alone do not constitute an offset for insanitary conditions or an arbitrary foreman with present-day discriminating employes, nor does welfare work make up completely for low wages. There is no question, however, but that reasonable attention to all the working conditions, as a right of the employes and not as a charity, is fully appreciated by them. It demonstrates the employer's real interest in their welfare and develops loyalty to his firm. Further, it makes it very difficult for professional agitators to get a responsive hearing. Therefore it fully pays from every angle it is considered.

Most discussions of improvement in industrial lighting bring out the increase in production as its most important benefit, the other advantages being incidental. There is much truth in this in most cases, especially when production increase is so urgently needed as just now. However, the other benefits are often very substantial and in certain cases of even greater monetary value than increase of output. It is believed, moreover, that they all have also a more or less direct bearing on production increase and this will be brought out in the following. While it is not easy to segregate the welfare benefits from the production benefit, the fact that the former contribute to the output increase must not be lost sight of in determining the aggregate value of an up-to-date lighting system.

### How Improved Lighting Betters Conditions for Working.

Some ten or a dozen years ago the appalling number of accidents in American industrial plants began to make an impression from which grew the "Safety First" movement. During the year 1910 an analysis was made of about 91,000 industrial accidents reported to one of the largest accident insurance companies with the surprising result that 23.8% of them were found due to poor lighting or in which poor lighting was an important contributing factor. Eight years afterward a similar study showed that this percentage had fallen to about 18%, a reduction of nearly 6%, in this class because of the intervening years of lighting betterment in the larger plants especially. Even with this reduction, the actual figures for the year 1918 show that our industries lose the services of 108,000 men for a whole year annually because of fatal and serious casualties due to lighting that is inadequate for safety, and 75 men each day lose their lives from such meager lighting in American plants. These figures represent a frightful toll in lives and suffering that should be almost entirely preventable. There is also the heavy loss to employers from paying work-

men's compensation. In the state of Massachusetts this loss and that of wages due to industrial accidents of this class is estimated to aggregate $1,000,000 annually, or sufficient to equip each factory, mill and workshop with an ideal lighting system and operate this for several years.

On this score it is not surprising to find that six states have in recent years enacted factory lighting codes laying down requirements as to lighting to safeguard the lives, limbs and eyes of factory employes. Several other states have pending the drafting of similar codes. All these codes are based primarily on the promotion of safety; their specified lighting intensities do not concern themselves with the stimulation of production, since the state cannot compel a manufacturer to be so progressive as to look out for his own best interests. It can compel him, however, to equip his plant with such safeguards, including lighting, as will remove the manifest hazards to his employes.

While he is rehabilitating his lighting to meet the modest safety standards, he would be shortsighted indeed if he did not at the same time and at slight additional cost exceed those standards and provide for lighting intensities that would clearly add to the productive efficiency of his men 10 to 25% or more, as was shown in the article published two weeks ago.

As regards safety and lighting it can therefore be definitely stated that the latter is absolutely necessary to the former and will become more so with the growing tendency to operate plants on the double or triple-shift basis per 24 hours. Data are at hand showing that industrial accidents are more numerous in winter than summer due to the larger percentage of dark hours. Modern lighting can make the night hours as safe and as productive as the daylight hours. The interests of the country require elimination of all preventable accidents, especially at a time when every idle hand is needed to add to the production of all those necessities that the entire world is turning to us to supply.

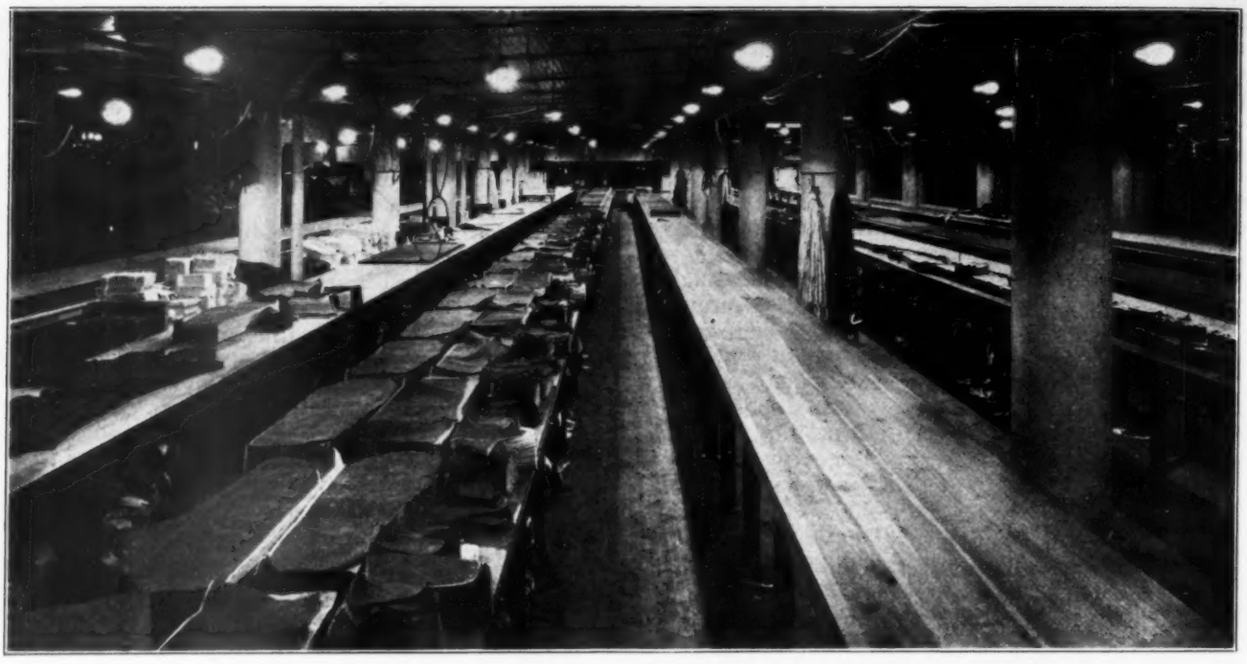
It is generally known that any effort to read or work in a meager light leads to serious eye strain. Similar strain is caused by improperly directed or poorly diffused light which may be ample as to intensity. Thus both inadequate and improper lighting are frequently the source of bad visual conditions by day as well as under artificial light.

One of the first results of eye strain is slowing up of the work; it takes longer to perform any operation under poor visual conditions than when the light is ample and suitable. Then continued eye strain produces a tendency to permanent impairment of vision and reduced visual efficiency. The gradual blindness thus often produced at relatively young ages is one of the saddest sacrifices to the plain disregard of scientific principles of illumination by either ignorant or negligent industrial managers.

Whether the poor lighting is temporary or prolonged, its accompanying poor visual conditions almost invariably result also in much work being spoiled. This, in fact, is found to be one of the most prolific causes of the heavy loss from spoilage in American industries, which amounts to the extraordinary sum of $28,000,000 annually due to poor lighting alone. This is a dead loss to the manufacturer which he can only compensate by adding to the cost of production.

The final results of eye strain and improper visual conditions from poor lighting are inferior quality of product, diminished output because of the lowered efficiency of the employe, increased labor turnover and frequently the growth of discontent developing into disputes. An example of this is depicted in an accompanying illustration showing a view in a knitting mill. The former direct lighting caused very serious glare due to the specular reflection from the polished needles. This almost blinded the operators and it was difficult

View in a Foundry the Excellence of Whose Lighting Makes Accidents Unlikely and Working Conditions Much More Favorable Than in the Average Foundry Where the Gloom Is Both Impressive and Depressive.



Night View in Cutting Room of an Overall Factory—Accidents and Spoilage Would Be Serious If Lighting of This Kind Were Not Provided.

to get them to hold their positions for much over a week. The time and money lost in training new operators almost ruined the firm. Finally a system of indirect lighting was installed that eliminated the glare and the troubles at once ceased.

In the old shops and mills it was quite common to find very dingy workrooms with low ceilings cluttered up with shafting, pulleys and belts; the windows were small, few in number and very dirty. Lighting conditions in such rooms were abominable even in broad daylight. On cloudy days and in the morning and evening hours these rooms were like dungeons and it is not surprising that the operators moved about as if they were in a daze. Accidents were very frequent, spoilage was high and the output low. Such gloomy and depressing workrooms are now rather scarce, thanks to the lighting codes referred to and to the activity of factory inspectors that have not waited for enactment of such codes.

There are still very plentiful cases of factories whose owners have not realized the full value of cheerful workrooms with large and clean windows and skylights, brightly painted walls and ceilings, unobstructed aisles and ceilings, orderly arrangement of machines, workbenches and stacks of material. A bright and pleasant workroom is like a cheerful environment in any place, it has a most wholesome influence in making the employes keen, alert and attentive to their work so that more accurate and speedier work is done, fewer mistakes are made, less material is spoiled, accidents become rare, less fatigue and depression is experienced, grumbling and discontent are almost unknown and the workers are more loyal to the interests of the firm.

Reference has been made to high labor turnover. The day is past when an employer felt this to be a convenient means for keeping down wages. Even when labor is plentiful large labor turnover is a serious loss and burden. It disrupts the organization, increases mistakes and accidents, and lowers the efficiency of the whole plant. Wherever it occurs there is something radically wrong that should by all means be remedied.

In not a few cases poor lighting has been the cause. One case has already been cited. Many cases are on record where employes have quit or threatened to leave in large numbers because the lighting was so inadequate that they could not produce the quality or quantity of work of which they might be proud. Especially has this happened where piecework or bonus payments prevailed; with poor lighting it was impossible to maintain desired standards and insufficient, acceptable product could be turned out to maintain a desirable compensation. Thus not only were the employes displeased but the employer was a loser.

The cost of an up-to-date lighting system that meets all the requirements of productive intensity, freedom from visual strain, safety, efficiency and low upkeep is surprisingly low in terms of the benefits derived thereby. This low cost is due to the rapidity of the scientific and practical development of the lighting art which in the last few years has made very important advances. Thus it has made possible production increases from 10 to 35% at a lighting cost of less than 1% up to about 5% of the payroll and this without adding to the number of employes. Aside from these ascertainable output increases there were the less definitely known but no less real betterments in working conditions referred to in this article.

It has already been shown that most of these miscellaneous benefits have a direct bearing on the output and are therefore partly included in the production increase from good lighting. But even if all of these benefits were intangible and there were no ready check on their monetary value, they are there and of great importance to the manufacturer and his employes as well. Take, for instance, reduction of labor turnover and possible disputes over lighting developing into strikes. The serious losses from these sources are by no means to be ignored and the manufacturer who puts in a modern lighting system as insurance against these troubles is doing nothing more extraordinary than the one who has removed from his plant all possible hazards from combustion and installed the best possible sprinkler system as at least partial insurance against trouble from fire.

# Central-Station Rates in Theory and Practice

## Eleventh Article—Conclusion of Mathematical and Graphical Analysis of the Conditions Under Which Price Splitting or Reductton Is Advantageous as Regards the Earnings of the Central-Station Company

By H. E. EISENMENGER

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*This is the eleventh article of this series of which a general outline appeared in the issue of July 5. The first seven articles, beginning July 12, were devoted to a discussion of the cost of electric service on which modern rate systems are based. In the last three articles the general principles underlying rate making have been treated, it being shown that what the author calls the "value-of-service" principle is superior to the strict "cost-of-service" plan. Insert IX, begun Aug. 30 and ended this week, analyzes the conditions for price reductions without curtailing earnings. A summary of the important conclusions of this analysis will be included in the next article when the main text will be resumed and continued through practically the remainder of the volume.*

### PART II—THE PRICE OF ELECTRIC SERVICE—Continued.

### Insert IX—Appendix to Section 80 et Seq.—Relations Between Selling Prices and Earnings—Continued.

II. Prices Depending on the Customer's Valuation (Value-of-Service Principle).

*2. Net Income.*

a. Shape of the Net Income Curve.

1. What Is the Net Income or the Rate of Return of a Group?

SECTION **25**. The preceding Sections 16-23 have shown how the conditions for an increase of the aggregate gross income as a consequence of a lowering of the price to certain groups of service can be reduced to certain qualities of the gross-income curve which belongs to the respective group (or groups) in which the price is to be lowered. If we try to extend this method to the net income (and to the rate of return) we must first decide what is to be called "the net income" or the "rate of return," respectively, of a particular group. We can determine the gross income of a certain group of service, but we cannot say without certain additional defining assumptions how large the net income or the rate of return is which results from that group because the aggregate cost (total cost) and the total capital invested cannot be assessed to the individual groups in a definite way unless we make certain assumptions.

**26**. We can now make various assumptions about what we want to call the "net income" and the "rate of return" of a certain group for the present purpose. The most obvious two methods of defining the net income and return of a group are (a) the incremental net income (return of the increments) and (b) what might be called the group's "segregate" net income (segregate rate of return); (compare also Section 3 of the main text).

**27**. The *"incremental net income"* is the difference: Increment of the gross income caused by the addition of that group to the other groups minus the increment of the combined cost[1] over the combined cost (aggregate cost) of all other groups. In other words, it is the difference of gross income derived from that group minus the increment of the combined (aggregate) cost of all other groups. The *"rate of return of the increments"* is the incremental net income, as just defined, divided by the increment of the capital.

**28**. The group's *"segregate net income"* is the difference of that group's gross income minus the group's segregate cost (see Section 3 of the main text; the "group's segregate cost" is the cost of serving that group alone if no other groups were in existence). Likewise the group's *"segregate rate of return"* is the quotient of the segregate net income, as just defined, divided by the capital which would be necessary to establish a manufacturing plant (central station, etc.) just large enough to provide for that group alone.

2. Incremental Net Income of the Group. (Sufficient and Necessary Condition.)

**29**. Starting again with the assumption that we have two groups of service only, $G$ and $g$, we call $N_{t_0}$ and $N_{t_1}$ the aggregate net incomes from both groups, corresponding to the aggregate gross income $B_{t_0}$ and $B_{t_1}$ above (Section 16 of this Insert). $N_{t_0}$ is therefore the aggregate net income if the unit prices charged in both groups are the same and equal to $p_0$, resulting in the sales $M_0$ and $m_0$ units in the two groups, respectively, whereas $N_{t_1}$ is the aggregate net income if in group $G$ the price is maintained at $p_0$ and in group $g$ it is lowered to some other amount $p_1$, increasing thereby the sales in that group from $m_0$ to $m_1$. Let the symbol $f(m)$ denote again the function which determines the cost (excluding the capital cost) if the amount produced is given by $m$ (variable). We have then

$$N_{t_0} = (M_0 + m_0)p_0 - f(M_0 + m_0) \ldots \text{Uniform price } p_0. \quad (17)$$

$$N_{t_1} = M_0p_0 + m_1p_1 - f(M_0 + m_1) \ldots \ldots \text{Price splitting downwards (lowering price in group } g) \ldots \ldots \ldots \ldots (18)$$

If price splitting downwards shall improve the net income, that is, if $N_{t_1}$ shall be $> N_{t_0}$, then

$$m_1p_1 - f(M_0 + m_1) \text{ has to be } > m_0p_0 - f(M_0 + m_0) \quad \ldots (19)$$

or using, as above, the symbol $b$ (gross income) for the product $mp$ so that $b_0 = m_0p_0$ and $b_1 = m_1p_1$

$$(b_1 - b_0) - [f(M_0 + m_1) - f(M_0 + m_0)] \text{ must be } > 0 \ldots (20)$$

Writing this in the form

$$\{ b_1 - [f(M_0 + m_1) - f(M_0)] \} - \{ b_0 - [f(M_0 + m_0) - f(M_0)] \} > 0 \quad \ldots \ldots \ldots (21)$$

we have in the first couple of braces the incremental net income of the group if the price is $p_1$ and in the second couple of braces the incremental net income over the other group if the price is at its original amount $p_0$. This means: *Lowering the price in a certain group is of advantage to the aggregate net income, if the incremental net income of that group is improved thereby.*

Such an improvement of the group's incremental net income according to relation (21) is the *necessary and sufficient* condition for an improvement of the aggregate net income by price splitting downwards, which means, if the

[1] The increment of the cost is the amount by which the aggregate cost is raised in consequence of the fact that the respective group is being supplied with service. The sum of the increment costs of all groups will be smaller than the total aggregate cost and the sum of the aggregate costs of all groups will be larger than the total aggregate cost. A balance will remain after summing up the increment costs of all groups which has not been assigned to any one of the groups (overhead cost). If we regard the total service as one group, the increment cost of that group is the excess of the aggregate cost over the cost at the production 0, and the cost at production $0 = OS_0$ (on the left-hand part of Fig. A*) will be left over, and not accounted for, so to speak. The same will apply if we have more than one group, provided the line of cost $s = f(m)$ or $S_0ST$, is a straight line, otherwise the unaccounted portion will be greater (always taking the incremental cost of every group over the combined cost of all other groups).

The same considerations prevail for the increment of the capital.

*See page 389 of Sept. 6 issue.

group's incremental net income is improved by price splitting downwards, the latter is always profitable and conversely, if price splitting downwards is profitable, the group's incremental net income must be improved thereby.

3. Segregate Income of the Group. (Sufficient But Not Necessary Condition.)

**30.** Can we establish a similar relation between the aggregate income of all groups and the *segregate* income of the group in which the price is to be lowered?

The segregate net income of group $g$ at the lowered price $p_1$ is greater than at the original price $p_0$ if

$$b_1 - f(m_1) > b_0 - f(m_0)$$

or $$(b_1 - b_0) - [f(m_1) - f(m_0)] > 0 \quad \ldots\ldots\ldots\ldots\ldots\ldots (22)$$

How does this compare with relation (21)? A glimpse at Fig. D will make this clear. We have here

$$OA' = m_0 \quad \ldots\ldots\ldots\ldots\ldots \quad A'A = f(m_0)$$
$$OB' = m_1 \quad \ldots\ldots\ldots\ldots\ldots \quad B'B = f(m_1)$$

where $m_1$ is greater than $m_0$ because the price $p_1$ is obtained from $p_0$ by price splitting downwards so that $p_1 < p_0$, consequently according to fact No. 1 of Section 1 of this Insert $m_1$ must be $> m_0$.

We have further in Fig. D

$$A'C' = B'D' = M_0 = \text{constant}$$
$$OC' = m_0 + M_0 \quad \ldots\ldots\ldots \quad C'C = f(m_0 + M_0)$$
$$OD' = m_1 + M_0 \quad \ldots\ldots\ldots \quad D'D = f(m_1 + M_0)$$
$$B''B = f(m_1) - f(m_0)$$
$$D''D = f(M_0 + m_1) - f(M_0 + m_0) \quad \ldots\ldots\ldots\ldots (23)$$

If now the curve $f(m)$ complies with fact No. 3 of Section 1 of this Insert, that is, if it rises continuously with increasing abscissae, turning the concave side towards the

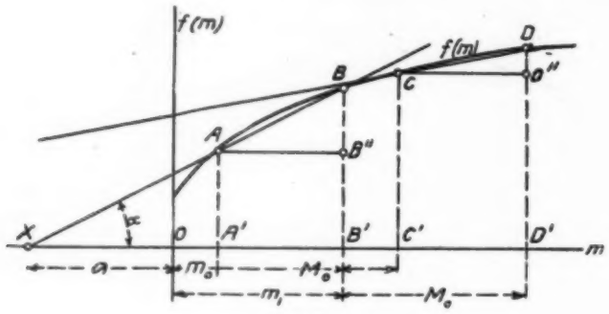



Fig. D.

axis of abscissae and approaching with increasing abscissae asymptotically a straight line, this means that $B''B > D''D$, because $A'B' = m_1 - m_0$ and $C'D' = (m_1 + M_0) - (m_0 + M_0) = m_1 - m_0$ and consequently $A'B' = C'D'$. For the limiting case where the $f(m)$ line is a straight line $B''B = D''D$.

This means from (23)

$$f(m_1) - f(m_0) \lesseqgtr f(M_0 + m_1) - f(M_0 + m_0) \quad \ldots (24)$$

Multiplying by $(-1)$ and adding $(b_1 - b_0)$ to both sides (24) becomes

$$(b_1 - b_0) - [f(m_1) - f(m_0)] \lesseqgtr$$
$$(b_1 - b_0) - [f(M_0 + m_1) - f(M_0 + m_0)]$$

The left side of relation (22) is therefore always $\leqq$ than the left side of (20), or if relation (22) is true, (20) and (21) must of necessity also be true, because if the term of (22) is positive, the term of (20) which is equal or greater, must of course also be positive. But we can reverse the statement only in case the $f(m)$ line is a straight line, which means: Unless $f(m)$ is a straight line there will exist cases in which (21) is true, but (22) is not.

In other words: An increase of the segregate group income for a certain price reduction is a sufficient condition for an improvement of the aggregate net income by price splitting downwards by means of that price reduction, but it is not a necessary one, unless the $f(m)$ curve is a straight line.

4. General Remarks.

**31.** What has been proved in Sections 18 and 19 of this Insert for the gross income can be demonstrated in exactly the same manner for the group's incremental net income and the group's segregate net income. It is unnecessary to repeat in detail all these results in their application to the net income (maximum of the aggregate net income, more than one maximum of the group's net income curve, increase of the net income either by price reductions in *all* or in some of the groups, increase of the net income if the original system of prices has been so designed as to result in the highest possible net income attainable with a uniform price). We can also without difficulty extend the conclusions to more than two groups.

**32.** Which condition is more strict, that for an increase of the gross income or of the net income by price splitting downwards? The gross income can be raised by price splitting downwards if, according to relation (14), $m_1 p_1 > m_0 p_0$, that is $b_1 > b_0$. The corresponding condition for the net income is, according to relation (20), $b_1 > b_0 + [f(M_0 + m_1) - f(M_0 + m_0)]$. Now since $p_0 > p_1$, it follows, according to fact No. 1 of Section 1 of this Insert, that $m_0 < m_1$ and, according to fact No. 3, that $f(M_0 + m_0) < f(M_0 + m_1)$. Therefore $[f(M_0 + m_1) - f(M_0 + m_0)]$ is always positive. Consequently with a given sales curve for group $g$ and with a given upper price $p_0$, high enough so that price splitting downwards increases the aggregate *gross* income, there will always exist certain values of the price $p_1$ which, although making $b_1 > b_0$, and therefore improving the aggregate *gross* income $B_t$ if added as lower prices, still will reduce the aggregate *net* income $N_t$ because $b_1$ does not reach the value $b_0 + f(M_0 + m_1) - f(M_0 + m_0)$.

For a graphical representation of the fact set forth in this Section see Section 33 et seq. of this Insert.

b. Shape of the Sales Curve.

**33.** It is of interest to investigate again, as has been done in the case of the gross income (Sections 20-23 of this Insert) how the condition for the possibility of increasing the net income without raising the prices to anybody is expressed in the shape of the sales curve. Calling

$$f(M_0 + m_1) - f(M_0 + m_0) = \Delta f(M_0 + m_0)$$

we can write relation (19) as

$$m_1 p_1 > m_0 p_0 + \Delta f(M_0 + m_0) \quad \ldots\ldots\ldots\ldots\ldots (25)$$

If we now call $r = \dfrac{\Delta f(M_0 + m_0)}{m_1 - m_0} = \dfrac{\Delta f(M_0 + m_0)}{\Delta m_0} \quad \ldots (26)$

this means $r$ is the average cost increment per unit[2] if the quantity produced rises from $(M_0 + m_0)$ to $(M_0 + m_1)$, or we can say $r = \tan\gamma$ in Fig. A.* If we substitute the value for $\Delta f(M_0 + m_0) = r(m_1 - m_0)$ from equation (26) into (25) we get

$$m_1 p_1 > m_0 p_0 + r(m_1 - m_0)$$

or $$m_1(p_1 - r) > m_0(p_0 - r) \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots (27)$$

The limiting case of this relation is given by changing the inequality sign into an equality sign:

$$m_1(p_1 - r) = m_0(p_0 - r) \quad \ldots\ldots\ldots\ldots\ldots\ldots (28)$$

**34.** Assuming now for the present that curve $s = f(m)$ be a straight line, the cost increment $r$ per unit will then be constant for any values of $m_0$ and $m_1$ (or $p_0$ and $p_1$, respectively). Equation (28) is then represented by a family of equilateral hyperbolas which is identical with that of equation (16) of this Insert, except that the vertical asymptote does no longer coincide with axis of ordinates $m$. It runs now at the distance $r$ to the right of that axis (Fig. E). The reasoning of Sections 22 and 23 of this Insert can now be applied to these hyperbolas.

The net-income hyperbola passing through a certain point will be steeper than the gross-income hyperbola passing through the same point. This is illustrated by comparing the family of net-income hyperbolas with the dash-and-dot gross-income hyperbola in Fig. E which has been selected at random.[3] Consequently, considering Section 23 of this Insert, the lowest limiting slope of the sales curve of group $g$ which still allows an increase of the earnings by lowering the price in that group will be greater in case of the net income than in case of the gross income. In other words, the conditions for an increase of the net income by price splitting downwards are more strict than the corresponding conditions for the gross income. (Compare Section 32 of this Insert.)

**35.** If now the curve $s = f(m)$ is no longer a straight line, but curved, in the only way in which it can be curved, that is with the concave side pointing steadily downwards, this means that $r$, see equation (26), will no longer be a constant for every $m_1$, but it will (for a given $m_0$ and $M_0$) grow smaller as $m_1$ increases and vice versa. It will, how-

[2] See the first footnote to Section 75 of the main text.

* See page 389 of Sept. 6 issue.

[3] It is hardly necessary to prove this in a more scientific way by comparing the angles of the slope of the two curves as given by the first derivative $dm/dp$ in both cases:

Gross-income hyperbola ..... $mp = \text{constant}$ ..... $\dfrac{dm}{dp} = -\dfrac{m}{p}$

Net-income hyperbola .. $m(p - r) = \text{constant}$ ..... $\dfrac{dm}{dp} = -\dfrac{m}{p - r}$

Therefore $dm/dp$ is smaller for the net-income hyperbola than for the gross-income hyperbola, but since $dm/dp$ is essentially negative in both cases, the absolute value of the angle of inclination of the net-income hyperbola is greater than that of the gross-income hyperbola passing through the same point.

ever, for very large amounts $m_1$—mathematically expressed, for $m_1 = \infty$—still have a finite positive value, viz.: the limiting value $c_{i\infty}$ of the increment cost $c_i$ per unit, if very large quantities of the "commodity" are manufactured (very large central stations). We will get, therefore, a different set of hyperbolas for every value of $m_1$ in such a manner that the vertical asymptote will move nearer and nearer to the vertical axis of co-ordinates with increasing $m_1$ without ever getting closer to it than a certain minimum $c_{i\infty}$. Consequently we can say that in case of a curve $f(m)$ line the conditions for increasing the net income by price-splitting downwards will be less strict for larger quantities $m_1$ than for smaller ones, but they will always be stricter than the corresponding conditions for the gross income.

The results of this graphical investigation are therefore entirely in harmony with the results of the analytical investigation carried out in Section 32 of this Insert.

### 3. *Rate of Return.*

#### a. Shape of the Rate-of-Return Curve.

#### 1. Total Rate of Return of All Groups.

**36.** Proceeding along the same general lines of reasoning as in Sections 16-24 and 25-35, respectively, of this Insert, we can investigate the criterion for an increase of the rate of return either analytically or graphically and arrive at the same results with either method.

Using the same symbols as heretofore, we can write

$$v_0 = \frac{(M_0 + m_0)p_0 - f(M_0 + m_0)}{F(M_0 + m_0)} \quad \ldots\ldots\ldots\ldots (29)$$

and

$$v_1 = \frac{M_0 p_0 + m_1 p_1 - f(M_0 + m_1)}{F(M_0 + m_1)} \quad \ldots\ldots\ldots\ldots (30)$$

where $F$ is the symbol for the function of $m$ which represents the capital invested (see left side of Fig. A) so that $F(m_x)$ is the capital necessary as an investment for the annual production of $m_x$ units; $v_0$ and $v_1$ are then the rates of return corresponding to the gross incomes $B_{t0}$ and $B_{t1}$, or to the net incomes $N_{t0}$ and $N_{t1}$, respectively, in the preceding Sections of this Insert, in such a manner that $v_0$ is the rate of return obtained if the price $p_0$ is charged to both groups $G$ and $g$, and $v_1$ is the rate of return if the price is lowered to $p_1$ in group $g$ and maintained at $p_0$ in $G$ (price splitting downwards).

#### 2. Return of the Increments. (Sufficient and Necessary Condition.)

**37.** In analogy with the investigations of "Net Income" (Sections 25 to 35 of this Insert) we shall investigate whether and how the criterion for an increase of the rate of return as a consequence of the lowering of the price in group $g$ alone can be expressed in terms of

(a) the return of the increments of group $g$ (see Section 27 of this Insert);

(b) the segregate rate of return of group $g$ (see Section 28 of this Insert).

The condition that the rate of return is raised by the change of the price $p_0$ to $p_1$, in group $g$ only is: $v_1 > v_0$ or $v_1 - v_0 > 0$, that is from (29) and (30):

$$\frac{[M_0 p_0 + m_1 p_1 - f(M_0 + m_1)]\,F(M_0 + m_0)}{F(M_0 + m_0)\,F(M_0 + m_1)} - \frac{[(M_0 + m_0)p_0 - f(M_0 + m_0)]\,F(M_0 + m_1)}{F(M_0 + m_0)\,F(M_0 + m_1)} > 0$$

This fraction is greater than 0 if the numerator is greater than 0 because the denominator is essentially positive. The condition can therefore be written as

$$[M_0 p_0 + m_1 p_1 - f(M_0 + m_1)]\,F(M_0 + m_0) - [(M_0 + m_0)p_0 - f(M_0 + m_0)]\,F(M_0 + m_1) > 0 \quad \ldots\ldots (31)$$

Substituting into this, for the sake of brevity, the following short symbols: $B_0$ for $M_0 p_0$, $b_0$ for $m_0 p_0$, and $b_1$ for $m_1 p_1$ we get

$$[B_0 + b_1 - f(M_0 + m_1)]\,F(M_0 + m_0) > [B_0 + b_0 - f(M_0 + m_0)]\,F(M_0 + m_1) \quad \ldots\ldots (31^*)$$

Setting $f(M_0 + m_1) - f(M_0 + m_0) = \xi$ and $F(M_0 + m_1) - F(M_0 + m_0) = \eta$

we can write (31*) as

$$[B_0 + b_1 - f(M_0 + m_0) - \xi]\,F(M_0 + m_0) > [B_0 + b_0 - f(M_0 + m_0)]\,[F(M_0 + m_0) + \eta]$$

from which

$$(b_1 - b_0 - \xi)\,F(M_0 + m_0) > [B_0 + b_0 - f(M_0 + m_0)]\,\eta$$

or

$$\frac{b_1 - b_0 - \xi}{\eta} > \frac{B_0 + b_0 - f(M_0 + m_0)}{F(M_0 + m_0)} \quad \ldots\ldots\ldots\ldots (32)$$

The fraction on the left side of this relation is the "rate of return of the increments," as will be readily seen by comparing it with the definition of that term as given in Section 27 of this Insert. The right side is the actual rate of return of both groups under the original charges $v_0$ [equation (29)], that is when the price $p_0$ is charged in both groups. It is easily seen that this can be extended to more than two groups and we arrive thus at the following law:

*Price splitting downwards by groups is of advantage to the rate of return as long as the rate of return of the increments in the respective group where the price is lowered is greater than the original rate of return.* (Sufficient and necessary condition.)

#### 3. Segregate Rate of Return. (Sufficient But Not Necessary Condition.)

**38.** In an attempt to introduce, in analogy with what has been shown previously (Section 30 of this Insert) about the net income, the more convenient term of the segregate rate of return $\frac{b_1 - f(m_1)}{F(m_1)}$ we start from the sufficient and necessary condition for an increase by price splitting downwards as given in relation (31*):

$$[B_0 + b_1 - f(M_0 + m_1)]\,F(M_0 + m_0) \text{ has to be } > [B_0 + b_0 - f(M_0 + m_0)]\,F(M_0 + m_1)$$

Calling the two sides of this relation $X$ and $Y$, respectively, so that $X > Y$, we can replace $X$ by a term $X_1 < X$ and the new relation $X_1 > Y$ will still be a condition for an improvement of the rate of return by price splitting downwards because, if even the smaller value $X_1$ is greater than $Y$, the larger value $X$ will all the more be greater than $Y$. We can thus say that any change in relation (31*) which reduces the left side relatively to the right side will leave the changed relation (31*) a condition for the improvement of the rate of return. But it will no longer be a *necessary* condition after that change because there will be cases where, although the substitute relation $X_1 > Y$ does not hold true, still the real criterion $X > Y$ will be fulfilled. On the other hand, we are never justified in *increasing* the left side relatively to the right side.

Let us now after this introductory remark turn back to relation (24), which may be written in the following form:

$$f(M_0 + m_1) - f(m_1) \text{ is always } \leqq f(M_0 + m_0) - f(m_0) \quad \ldots\ldots (33)$$

From fact No. 4 of Section 1 of this Insert we have further

$$F(M_0 + m_0) \text{ is always } < F(M_0 + m_1) \quad \ldots\ldots\ldots\ldots (34)$$

because $m_0 < m_1$.

Multiplying the left and right sides of (33) and (34) with one another, respectively, we get

$$[f(M_0 + m_1) - f(m_1)]\,F(M_0 + m_0) \text{ is always } < [f(M_0 + m_0) - f(m_0)]\,F(M_0 + m_1) \quad \ldots\ldots\ldots (35)$$

Adding (35) and (31*) will increase the right side of (31*) more than the left side, and is therefore permissible, according to what has just been found out above. (31*) then changes into

$$[B_0 + b_1 - f(m_1)]\,F(M_0 + m_0) \text{ has to be } > [B_0 + b_0 - f(m_0)]\,F(M_0 + m_1) \quad \ldots\ldots\ldots\ldots (36)$$

Returning now to Fig. D of this Insert it can be shown[4]

$$\frac{A'A}{C'C} < \frac{B'B}{D'D} \quad \ldots\ldots\ldots\ldots (37)$$

Assume now the curve in Fig. D to represent not the $f(m)$ line but the $F(m)$ line, an assumption which is perfectly permissible since both curves have the same character. We can thus write (37) as

$$\frac{F(m_0)}{F(M_0 + m_0)} < \frac{F(m_1)}{F(M_0 + m_1)} \quad \ldots\ldots\ldots\ldots (38)$$

---

[4] The secant $AB$, produced to the left, intersects the axis of abscissae at the distance $a$ to the left of the origin of co-ordinates and the secant $CD$ intersects it at the distance $c$ where $a \leqq c$. The slope of the secant $AB$ will be called $\alpha$ and that of $CD$ will be called $\gamma$. We have now (see Fig. D):

$$\frac{A'A}{C'C} = \frac{(a + m_0)\tan\alpha}{(c + M_0 + m_0)\tan\gamma} \text{ and } \frac{B'B}{D'D} = \frac{(a + m_1)\tan\alpha}{(c + M_0 + m_1)\tan\gamma}$$

For a comparison of the sizes of the two terms we can suppress the factor $\tan\alpha/\tan\gamma$ in each term and write the remaining part of $B'B/D'D$ in the form

$$\frac{(a + m_0) + (m_1 - m_0)}{(c + M_0 + m_0) + (m_1 - m_0)}$$

We see that this fraction which represents $B'B/D'D$ corresponds to the fraction that represents $A'A/C'C$ except that both numerator and denominator are enhanced by the same amount $(m_1 - m_0)$. If we add a constant amount to both numerator and denominator of a fraction the value of that fraction will approach closer to unity and since $\frac{a + m_0}{c + M_0 + m_0}$ is smaller than unity (because $a \leqq c$) the value of the fraction will increase, that means $B'B/D'D > A'A/C'C$.

It is now again permissible to multiply (36) by (38) because this will relatively reduce the left side of (36) and we get thus the requirement as

$$[B_o+b_1-f(m_1)]\,F(m_o) \text{ has to be} > [B_o+b_o-f(m_o)]F(m_1)$$

or

$$\frac{B_o+b_1-f(m_1)}{F(m_1)} \text{ has to be} > \frac{B_o+b_o-f(m_o)}{F(m_o)} \quad \ldots\ldots(39)$$

or

$$\frac{B_o+n_{s_1}}{F(m_1)} \text{ has to be} > \frac{B_o+n_{s_o}}{F(m_o)} \quad \ldots\ldots(40)$$

where $n_{s_1}$ and $n_{s_o}$ are the segregate net incomes of group $g$ for the prices $p_1$ and $p_o$, respectively.

These last two relations (39) and (40) are as close as we can get to basing a sufficient but not necessary condition on the segregate income and segregate capital of the group $g$. It is impossible to further simplify this relation by the elimination of $B_o$ for the following reason. We have obviously

$$\frac{B_o}{F(m_1)} < \frac{B_o}{F(m_o)} \quad \ldots\ldots(41)$$

because $F(m_1) > F(m_o)$. If it were permissible to subtract (41) from (40) this would eliminate $B_o$ but it would mean relatively increasing the left side of (40) with respect to the right side and that is just what is *not* permissible, as shown above.

We can therefore formulate as follows a sufficient but not necessary requirement for an increase of the rate of return by price splitting in group $g$: *The lowering of the price must increase a modification of the segregate rate of return of group g which is formed by adding the gross income of all other groups G to that of group g before the reduction of the segregate cost of group g and the division by the capital necessary for the group g.*

4. General Remarks.

**39.** Here again everything that has been said in Sections 18 and 19 of this Insert for the gross income can be proved for the group's rate of return of the increments and for the modification of the group's segregate rate of return, the former as necessary and sufficient requirement, the latter as sufficient requirement. This refers, for instance, to the maximum of the rate of return obtainable by price splitting downwards, etc., as per Section 31 of this Insert.

b. Shape of the Sales Curve.

**40.** We can get a clearer mental picture of the conditions under which a lowering of the price in group $g$ can improve the rate of return from all groups if we apply to the rate of return (dividend) the graphical method which has been shown with reference to the net income in Sections 33-35 of this Insert. This is done in the following:

Call

$$\left.\begin{aligned}\Delta m_o &= m_1 - m_o\\ \Delta p_o &= p_1 - p_o\end{aligned}\right\} \quad \ldots\ldots(42)$$

and

$$\left.\begin{aligned}\Delta f(M_o+m_o) &= f(M_o+m_1) - f(M_o+m_o)\\ \Delta F(M_o+m_o) &= F(M_o+m_1) - F(M_o+m_o)\end{aligned}\right\} \quad \ldots(43)$$

Substituting this in relation (31), which is the condition for an increase of the rate of return by price splitting downwards in group $g$, we get

$$[M_o p_o + (m_o+\Delta m_o)(p_o+\Delta p_o) - f(M_o+m_o) - \Delta f(M_o+m_o)]\,[F(M_o+m_o)] - [(M_o+m_o)p_o - f(M_o+m_o)]\,[F(M_o+m_o)+\Delta F(M_o+m_o)] > 0$$

or after proper reduction

$$[m_o\Delta p_o + p_o\Delta m_o + \Delta m_o\Delta p_o - \Delta f(M_o+m_o)]\,F(M_o+m_o)] > [(M_o+m_o)p_o - f(M_o+m_o)]\,[\Delta F(M_o+m_o)] \quad \ldots\ldots(44)$$

We call now in analogy to equation (26) of this Insert

$$t = \frac{\Delta F(M_o+m_o)}{\Delta m_o} \quad \ldots\ldots(45)$$

$t = \tan\tau$ (see left part of Fig. A) represents the same value with respect to the capital-curve $k$ as $r$ does with respect to the cost-curve $s$. We get by substituting (26) and (45) into (44):

$$[m_o\Delta p_o + (p_o+\Delta p_o - r)\,\Delta m_o]\,F(M_o+m_o) > [(M_o+m_o)p_o - f(M_o+m_o)]\,t\Delta m_o$$

Divide both sides by $F(M_o+m_o)$ and substitute $v_o$ from (29)

$$m_o\Delta p_o + (p_o+\Delta p_o - r)\Delta m_o > v_o t\Delta m_o$$

$$(p_o+\Delta p_o - r - v_o t)\,\Delta m_o > m_o(-\Delta p_o)$$

or

$$\frac{\Delta m_o}{m_o} > \frac{-\Delta p_o}{p_o+\Delta p_o - r - v_o t}$$

Adding the denominator to the numerator on both sides and substituting $m_1$ for $(m_o+\Delta m_o)$ and $p_1$ for $(p_o+\Delta p_o)$ from (42) we get

$$\frac{m_1}{m_o} > \frac{p_o-(r+v_o t)}{p_1-(r+v_o t)}$$

$$m_1[p_1-(r+v_o t)] > m_o[p_o-(r+v_o t)] \quad \ldots\ldots(46)$$

This formula is entirely analogous to (27) of this Insert except that, instead of deducting the unit increment cost $r$ of the service from the price, we have to deduct the sum of the unit increment cost plus the interest $v_o t$ on the unit increment capital $t$, the interest being computed at the same rate of return $v_o$ at which the original capital has been bearing interest before the price reduction.

**41.** Everything that has been said in Sections 33 to 35 of this Insert regarding the effect of price splitting downwards on the net income applies also to the rate of return, except that the distance of the vertical asymptote from the axis of ordinates (Fig. E) is not $r$ (increment cost) but $r+v_o t$ (increment cost plus interest on the increment capital). This makes the condition for an increase of the rate of return stricter than that for the net income (compare Section 34 of this Insert).

*4. Resumé.*

**42.** A resumé in non-mathematical terms of those of the above laws which are concerned with the advantageousness of price splitting downwards is contained in Sections 81 to 86 of the main text. This resumé brings out a few points of view not touched upon in this Insert.

*(To be continued.)*

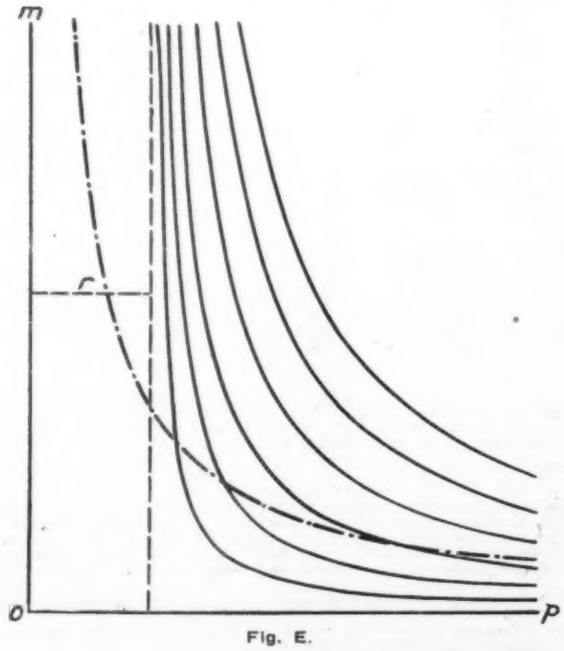



Fig. E.

## SUMMER COURSE COMPLETED BY ENGINEERING TEACHERS.

Eleven college professors, representing institutions from Brooklyn to Tokyo, recently concluded the annual course for engineering teachers at the East Pittsburgh works of the Westinghouse Electric & Manufacturing Co. The course was of a month's duration and composed inspection trips throughout the plant, observation of work, and lectures by the various experts of the company. A feature introduced at the lectures was the use of motion pictures to portray the important work of electricity in modern andlarge-scale-engineering projects of many kinds.

The professors who were in attendance at the summer course are: M. P. Cleghorn, Iowa State College; W. D. Emerson, University of Maine; R. S Howell, Georgia Institute of Technology; L. J. Hodgins, Maryland State College; J. E. Lear, University of North Carolina; B. K. Northrop, Cornell University; S. Noda, Imperial University of Japan; C. W. Piper, Purdue University; J. W. Shuster, University of Wisconsin; A. F. Puchstein, Ohio State University, and E. B. Wood, Pratt Institute.

# Details of Proposed 220-Kilovolt Transmission Line for California

## Conditions to Be Met — Salient Features of 220-Kv. Line to Transmit 1,500,000 Kw. 1100 Miles — Paper Read Before A.I.E.E. Convention

By R. W. SORENSON, H. H. COX and G. E. ARMSTRONG

FUELS, particularly oil, must soon be used for isolated power only in places where electric power is not available, as in the propelling of air and ocean craft. In large power systems, especially in the West, the use must be limited to standby service, for peak loads, low water periods, and other emergencies.

### Power Resources.

California has available ample hydroelectric power to supply the industrial and agricultural demand for many years.

Small developments aggregating 325,000 kw. have been completed and many others of this type are available. There are also four large projects as indicated in Table I which can be readily developed to a capacity of 1,500,000 kw. in the near future.

TABLE I—LARGE POWER RESOURCES.

| | New developed and under construction. Kw. | Proposed developments 1926. Kw. | Reasonable future development (not ultimate capacity). Kw. |
|---|---|---|---|
| Pit River | None | 200,000 | 500,000 |
| Feather River | 100,000 | 200,000 | 300,000 |
| Big Creek | 100,000 | 300,000 | 500,000 |
| Colorado River | None | None | 200,000 |
| Total | 200,000 | 700,000 | 1,500,000 |

Total 1926 hydroelectric power development including small projects, 1,025,000 kw.

The data for the tables given here of resources and loads, of the northern part of the state, is taken from the various reports which have been published, and no attempt has been made to verify them.

### Load Demand.

The best available information indicates a demand in 1926 approximately as shown in Table II.

TABLE II.

| | Kw. |
|---|---|
| 1. Sacramento Valley, northern portion | 70,000 |
| 2. Truckee River electrification | 40,000 |
| 3. Sacramento Valley, southern portion | 125,000 |
| 4. San Francisco Bay district | 250,000 |
| 5. Fresno district | 90,000 |
| 6. Bakersfield district, including Tehachapi electrification | 125,000 |
| 7. Los Angeles district | 300,000 |
| 8. Barstow and Needles district, including railroad electrification | 40,000 |
| Making a total of | 1,040,000 |

In order to carry this load, approximately 500,000 kw. additional in hydroelectric capacity will be required.

A demand for power such as is shown in Table II can be supplied most economically by power developed in large units. Large power units require transmission lines of the highest possible economic voltage.

It has been shown by Silver, June A. I. E. E. Proceedings, that for long transmission 220,000 volts is economical under conditions which require a much more expensive construction than has proven adequate for the 150,000-volt lines of the Southern California Edison Co.

### California Transmission Bus.

On this basis a plan as shown on the map of Fig. 1 is proposed. In this plan the interconnection of all the California power companies has been assumed as an economic necessity for its best utilization. Interconnections of limited capacity are not entirely satisfactory because they fail just at the time they are needed most to transfer from one system to another large blocks of power.

The plan of the proposed scheme involves the construction of a two-circuit transmission system extending from Pit River to Los Angeles, a distance of 570 miles. Branch lines of like voltage connect the three other power projects and the San Francisco load center to this main line on which the other load centers are located. The main line thus becomes a high-tension bus extending nearly the entire length of the state, hence its name: California transmission bus.

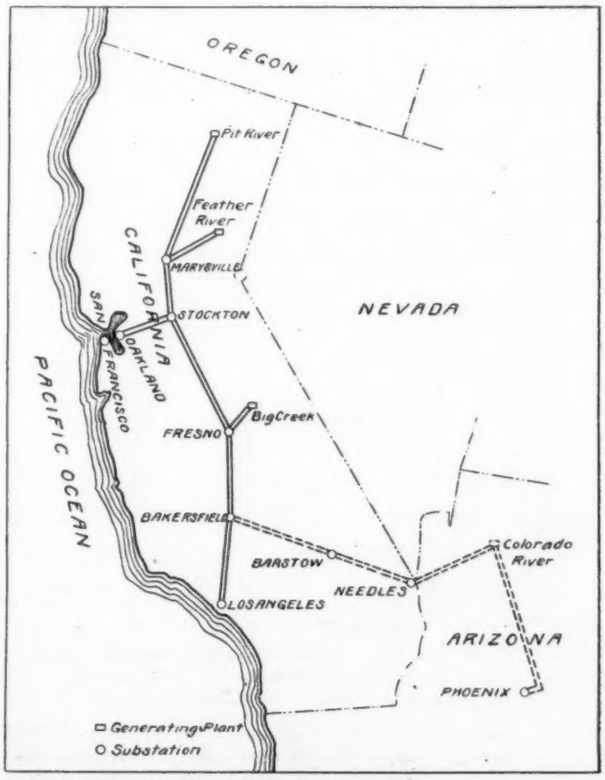



Fig. 1.—California 1100-Mile 220-Kv. Transmission Bus.

This arrangement makes possible unlimited interconnection and exchange between all the power companies of the state.

Substations have been located at Marysville, Stockton, San Francisco, Fresno, Bakersfield and Los

Angeles. These points are natural load centers and suitable points for connecting with the present power systems. On the Colorado River branch, the construction of which is dependent upon the electrification of the transcontinental railroads, substations would probably be located at Barstow and Needles. The substations divide the lines into sections of suitable length for practical operation, the longest section being 150 miles, as shown in Table III.

TABLE III.

| | Miles. |
|---|---|
| Pit River to Marysville | 150 |
| Feather River to Marysville | 60 |
| Marysville to Stockton | 90 |
| Stockton to San Francisco | 80 |
| Stockton to Fresno | 130 |
| Big Creek to Fresno | 40 |
| Fresno to Bakersfield | 100 |
| Bakersfield to Los Angeles | 100 |
| Bakersfield to Barstow | 110 |
| Barstow to Needles | 150 |
| Needles to Colorado River | 100 |
| Colorado River to Phoenix | 100 |
| Pit River to San Francisco | 300 |
| Big Creek to Los Angeles | 240 |
| Big Creek to San Francisco | 236 |

## The Transmission Line.

The standard frequency, 60 cycles, has been assumed on the basis that the Southern California power systems operating at 50 cycles will ultimately find it advantageous to conform to the A. I. E. E. standard. In the natural growth of the load as shown in Table II, 70% of the 1926 load will be supplied by the 60-cycle systems. Interconnection of such large load centers or power sources through frequency changers, limits the exchange of power, is uneconomical, and increases tremendously the required operating vigilance.

The practicability of the high-voltage line has been well demonstrated by over five years of remarkably successful operation of the 150,000-volt lines of the Southern California Edison Co., which, during this

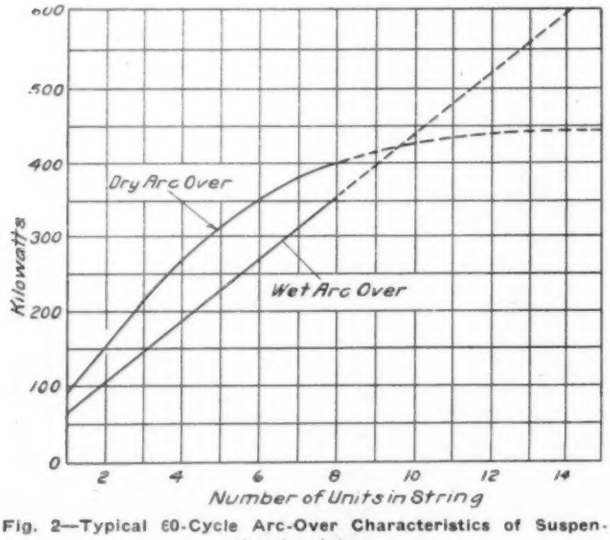



Fig. 2—Typical 60-Cycle Arc-Over Characteristics of Suspension Insulators.

period, have delivered from the Big Creek power houses over the 240-mile lines to the Los Angeles distribution systems, 1,200,000,000 kw-hr. at an average efficiency of 87.5% with a 45% load-factor. During this period there have been no interruptions for which the high voltage is responsible, and on the contrary, the system has been free from disturbance and interruption to a greater degree than the lower voltage lines in the same locality.

The present Big Creek lines can be operated at 220,000 volts, 60 cycles, without material change, and this is proposed as a link of the transmission bus, and its operation under these conditions will be analyzed and applied to conditions of the proposed system.

## Analysis of Big Creek System.

*Corona.*—As now operated at 150,000 volts and 50 cycles, the voltage is only 80% of the lowest critical

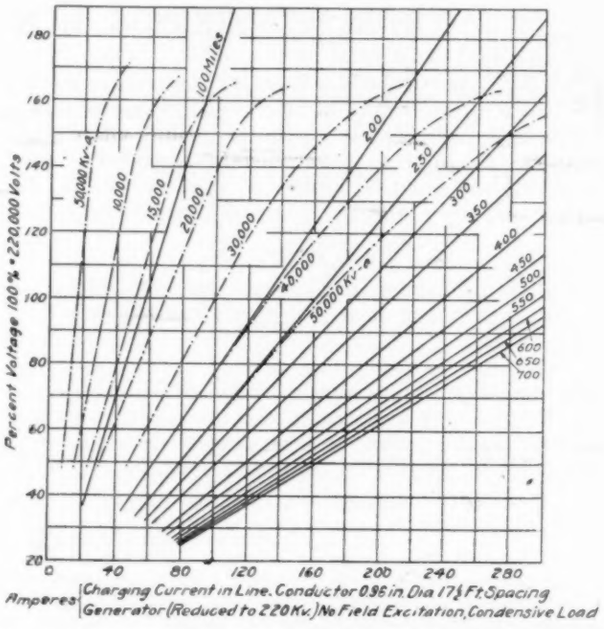



Fig. 3.—Generator and Line Characteristics: 60 Cycles, 220,000 Volts, Generators With Short Circuit Ratio 1.0.

voltage of any part of the line and there is no corona loss. At 220,000 volts, 60 cycles, corona loss occurs to some extent on the entire line but amounts to but 0.4% of the line capacity during fair weather. With storm conditions over the entire line, and with an assumed reduction of 20% in the critical voltage, the corona loss would be 8% of the line capacity. This loss is not sufficient to make the line inoperative and would occur too rarely to be an economic factor.

*Insulation.*—The Big Creek 150,000-volt lines have nine units in each suspension string and two 11-unit strings in parallel on dead ends. During the five and one-half years of operation only two insulator string failures have occurred. Both of these were during normal conditions of operation without any apparent cause, other than that of being in a location where the insulators have been found to have a relatively high rate of deterioration.

The Big Creek line towers allow sufficient clearance to permit the lengthening of the nine unit suspension strings to eleven units, and to any desired number of units at dead ends. Table IV shows safety factors for insulator strings, wet and dry.

TABLE IV.

Safety Factors for Insulator Strings.

| | Wet arc-over 9-unit string. | Wet arc-over 11-unit string. | Dry arc-over 9-unit string. | Dry arc-over 11-unit string. |
|---|---|---|---|---|
| ( 87 kv. to ground) 150 kv..... | 4.3 | | 4.8 | |
| (127 kv. to ground) 220 kv..... | | 3.7 | 3.2 | 3.4 |

The Big Creek line operated at 220,000 volts is at the critical corona voltage and any disturbances resulting in a higher voltage will quickly expend their

energy in producing corona loss, which will permit a smaller safety factor to be used.

Fig. 2, curves showing arc-over voltage as reproduced from Mr. Silver's paper, "Problems of 220-kv. Power Transmission," show no practical gain in dry arc-over voltage for strings of more than ten units and with these facts in view, it is proposed that for operating the Big Creek line at 220,000 volts, suspension strings have 11 units and dead end strings 12 units in series. Insulator testing crews have several times reported four and five defective units in a nine-unit suspension string, without any indication of trouble. The only apparent value of a longer string than that proposed would be a decreased probability of sufficient defective units in a string to cause breakdown. Developments of methods of grading insulator units and shielding insulator strings will, in all probability, materially change curves of Fig. 2.

Present-day methods of insulator testing and maintenance would probably have prevented the two failures which have occurred on the Big Creek lines as previously mentioned. These methods applied to the lines operating at 220,000 volts, and the use of the better types of insulators now available, will insure successful operation.

*Charging Current.*—Long high-voltage lines can not be operated without synchronous condensers at the receiving station to regulate the voltage, and as a consequence the charging current, even at the standard 60-cycle frequency, becomes a factor of no great importance as long as these synchronous condensers are connected to the line.

Without these condensers the line charging current must be furnished entirely by the generators, in which case the generators may become greatly overloaded and at the same time produce a very high voltage over which the operator has no control. To avoid this emergency a transmission line with its generators, transformers and synchronous condenser must be considered as a unit and as such should be securely coupled together electrically at all times. This has been proven practical in the case of the Big Creek system in which it is possible to start the 15,000-kv-a. condensers and bring them up to speed with the generators.

*Line Capacity.*—The Big Creek lines as operated at 150,000 volts with 30,000-kv-a. condenser capacity per line at the receiver end are each good for 57,500 kw. at 85% power factor, and will have under these conditions a line drop of 11%.

Operated at 220,000 volts, these lines should each have a capacity of 125,000 kw. with an equal line drop when provided with the proper condenser capacity, which is approximately 75% of the line capacity in kilowatts.

This is a fair indication of the conditions which will exist in the proposed system, the load centers of which are so distributed as to limit the actual average distance of transmission to about 200 miles. The economic gain in doubling the capacity of lines which cost approximately $6,000,000, the present cost of which would be at least 30% more, would more than offset the cost of all necessary changes, including the adoption of the standard frequency.

*Mechanical.*—The type of construction used on the Big Creek line has proven entirely adequate for California conditions. There have been only three mechanical failures, all of which occurred shortly after the line went into service and were all due to defective line hardware. In one case the failure was due to faulty design. This fault was entirely corrected by re-designing the cable clamp so as to grip the steel core independently of the aluminum conductor. The other two were due to individual defects in parts. There have been no tower failures and no tower maintenance whatever has been required. Approximately 20% of the Big Creek line is subject to ice and snow conditions, parts of it reaching altitudes of 5000 ft. Similar conditions exist over practically the entire proposed 220,000-volt system.

*Operation.*—The most interesting feature of the operation of the Big Creek system is its reliability, which has been equal to that of steam plants of similar capacity located near load centers. Flashovers have caused only momentary interruptions and have in no case resulted in damage such as to prevent immediate resumption of service. During the greater part of the time the power has been carried over a single line for a large part of the distance.

The operating history of the Big Creek system discloses no evidence of any trouble due to the high voltage of the system, and in addition has demonstrated that higher voltages may be used with equal or greater reliability. The Big Creek 17,500-kv-a. generators have operated at 60 cycles satisfactorily and delivered full output at this frequency.

High tension line switching and synchronizing has been carried on consistently throughout the operation of the Big Creek system without trouble and should be possible on the 220,000-volt system. During times of switching slight discharges, never followed by any energy current, occur on the arresters. Operating at corona voltage rather than at 80% of the critical

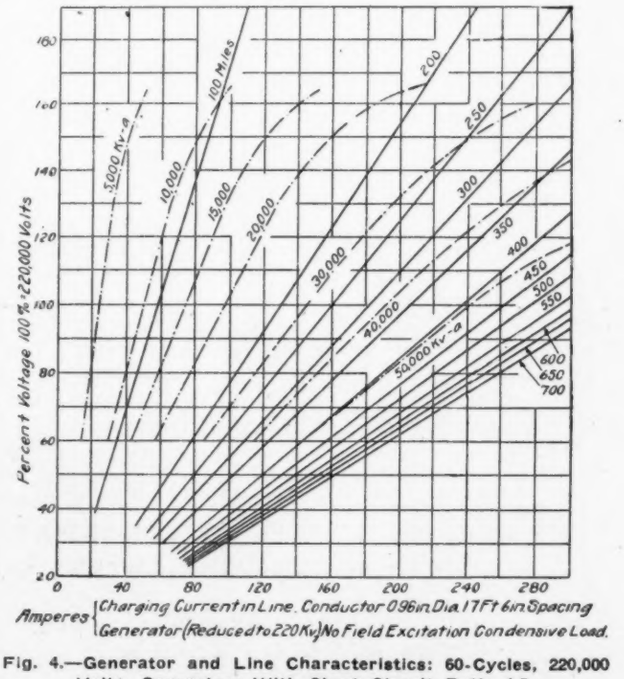



Fig. 4.—Generator and Line Characteristics: 60-Cycles, 220,000 Volts, Generators With Short Circuit Ratio 1.5.

voltage, it may be possible to absorb these disturbances without arresters.

Complete parallel operation of all lines must be adhered to in the proposed system. Satisfactory protective relay systems for dropping defective sections with little disturbance have been developed for present parallel transmission lines and there appear to be no obstacles to extending these to the higher voltages.

*Generators.*—Curves of Figs. 3 and 4 show gen-

erator and line characteristics for 60-cycle, 220,000-volt systems. The full lines are the charging currents in amperes for different lengths of line plotted against per cent normal voltage. The broken lines are generator characteristics of various sizes of generators when connected to condensive loads with no field excitation. The point of intersection of the generator curves with the line charging current curve for any particular length of line determines the voltage to which the generator will build up when connected to that length of line with no field excitation. Fig. 3 is for generators with a short circuit ratio of 1.0 while Fig. 4 is for those with a ratio of 1.5.

Fig. 3 shows that with 50,000 kv-a. of generating capacity connected to a line of 250 miles, the line can be charged without losing control of the voltage with generators of this design. By having synchronous condensers connected to the line at the receiving station generators of this capacity will bring up any length of line necessary to the successful operation of the proposed system. Those curves show that generators for such a system should be designed with the highest short circuit ratio that other conditions will permit, in order to reduce to a minimum the tendency to become self-exciting.

COMPARATIVE DATA.

| | Big Creek lines at 150-kv. | 220-kv. lines as proposed by Silver |
|---|---|---|
| Aluminum steel cable: | | |
| Diameter, ins. | 0.95 | 1.036 |
| Circular mils | 683,000 | 808,900 |
| Weight per ft., lbs. | 0.75 | 0.94 |
| Length of average span, ft. | 750 | 800 |
| Weight of towers without footings, lbs.: | | |
| Suspension | 4,300 | 9,000 to 14,000 |
| Anchor | 6,450 | 24,000 |
| Stringing tension at 80° F., lbs.: | | |
| No ice allowance | 4,740 | |
| Ice allowance | 3,130 | |
| Maximum tension allowed, lbs. | 8,500 | 17,300 |
| Insulator strings to carry load: | | |
| Suspension | 1 | 2 and 3 |
| Anchor | 2 | 6 |

IMMEDIATE ACTION NEEDED.

Such a system as proposed is needed immediately; all engineering fundamentals essential to a solution of its problems are well understood, and the Big Creek system can be used as a part of the project without material reconstruction.

To supply this need, arrangements should be made without delay for a complete working out of all details of the proposed system, as otherwise in the future it may be necessary to do a large amount of reconstruction to bring together individually designed systems, which is never a wholly satisfactory procedure.

## AMERICAN SOCIETY FOR TESTING MATERIALS CHANGES HEADQUARTERS.

**Moves Its Offices from University of Pennsylvania to the Engineers' Club of Philadelphia.**

Announcement is made by the Executive Committee of the American Society for Testing Materials that the headquarters have been changed from the University of Pennsylvania to the Engineers' Club of Philadelphia, 1315-17 Spruce street. The headquarters of the society will be on the third floor where extensive alterations are now being made. Pending the completion of the alterations, the society will occupy temporarily the first floor of the building, beginning Sept. 13.

The change of headquarters of the society, which has been located at the University of Pennsylvania since its inception in 1902, is made necessary by its growing activities and membership. In continuing the office at Philadelphia the Executive Committee has not acted hastily, but have taken time to compare the advantages of the Philadelphia location with those that would exist in other parts of the country. The city of Philadelphia presented so many advantages that the Executive Committee decided upon that place as the most satisfactory location.

The new headquarters of the society are centrally located and convenient to the principal hotels and railway stations. The Engineers' Club is affiliated with the Philadelphia section of many of the national engineering and technical societies, and is the center of engineering activities in Philadelphia. An auditorum on the second floor of the bulding, with a seating capacity of 125, and a committee room in the society's headquarters will offer very satisfactory facilities for meetings of the committees of the society. Out of town members may use the society's headquarters as their mailing address while in Philadelphia, and facilities will be provided in the society's rooms for correspondence.

## WASHINGTON COAST UTILITIES TAKE OVER PORT ANGELES PLANT.

The Washington Coast Utilities, Seattle, has taken over the active management of the hydroelectric plant and transmission lines of the Northwestern Power & Mfg. Co. of Port Angeles, Wash. The property comprises two 3000-kw. generators on the Elwha river, operating under a 100-ft. head, and 110 miles of transmission lines, carrying energy at 66,000 volts. Where this line crosses Hood's Canal, to Port Gamble, a new submarine cable 9000 ft. long is being laid, whereby the company's carrying capacity will be doubled. Transformers of 3000-kv-a. capacity are being installed on each side of the canal by which the voltage is to be stepped down to 15,000 for submarine transmission, and then stepped up to the regular line voltage. This cable is composed of three No. 4 and No. 2 copper conductors, insulated by 11/32-in. of 30% para rubber, and it is then jute covered and armored. The cable weighs 8 lbs. to the lineal foot.

F. D. Nims, who has the management of Washington Coast Utilities, states that power produced here is wholesaled to Port Angeles, Port Townsend, the Coast Defense forts, to Bremerton and the Navy Yard.

## FIXTURE MANUFACTURERS WILL MEET IN DETROIT IN FEBRUARY.

The next convention of the National Council of Lighting Fixture Manufacturers will be held in Detroit, February, 1920. This was decided upon at the mid-summer convention held in Cleveland, Ohio, Aug. 5 and 6. Other important work done by the convention was the appointment of a committee for the registration of new designs and of another to perfect a uniform cost accounting system for the members of the council.

All the principal concerns in the country were represented at the convention. The first day's session was held in the club rooms of the Electric League, in the Statler Hotel, and the second day's meeting was at Nela Park, where all those in attendance were guests of the National Lamp Works.

# Equipment for Handling Coal and Ashes in Power Plants—

## Influence of Methods Upon Plant Operation—Classification of Mechanical Methods of Handling Coal and Ashes—Power Calculations

By ROBERT JUNE

*Mechanical Engineer.*

"WHAT do you consider the most important advantage of your mechanical coal handling equipment?" I asked the superintendent of a large manufacturing plant the other day.

His answer, given without a moment's hesitation, was, "Elimination of the large and uncertain labor element. We have twenty 500-hp. boilers, and at two seasons of the year we require every pound of steam we can get from those boilers, day and night for weeks at a time. Before we put in our automatic coal handling system we were at the mercy of the coal handlers and passers.

"Time and again the operations of our entire plant were embarrassed and the work in some departments even brought to a dead stop, by the lack of a full boiler-room crew. We always paid good wages, but the physical conditions under which the men had to work were not good, and on a number of occasions I have been called up at my home late at night, and had to dress and start out in my car on a search for laborers. This was no joke at any time, but when it happened on a cold rainy night, or with a blizzard for accompaniment, you can imagine the difficulties in getting men to leave their warm beds for any money or other considerations I might offer. On more than one occasion, when I arrived at the plant with my hastily gathered crew, they took one look at our coal piles drowned in rivers of rain and sleet, or else frozen solid with a forty mile gale whisking about them and the thermometer down around zero, and refused point-blank to touch a tool.

"Automatic coal handling has changed all that. Because of the assurance of continuity of operation, the mechanical system we now have in is worth several times what it cost us. We would employ it, if it cost us twice as much per ton delivered to the boilers as hand labor."

That is one point of view. Another man, manager of a good sized plant, said, "We installed mechanical coal handling because we were able to lay out a system which gave us three times as much storage capacity as we formerly had, and we felt it essential to insure an adequate supply of coal at all times."

A third point of view, typical of many, was expressed by a large operator. "We wanted to reduce handling costs as much as possible, and therefore substituted mechanical means for manual handling. Need I tell you that the savings effected have been very large, particularly during the past two years."

As a rule, one good reason is all a man wants as explanation for an action, hence the failure of the gentlemen quoted to mention the advantage which appealed to the others. Upon further questioning, however, each mentioned the additional points as supplementary benefits which they enjoyed.

There does not seem to be any doubt that nineteen plant managers out of twenty, who have installed mechanical handling are thoroughly satisfied that they made a move in the right direction. Some of them, it is true, would make radical changes in their equipment and layout if they had the work to do over. The point is that they *would* do it over again. Dissatisfaction, where it exists, is with the application of the system, not with the principle.

As Reginald Trautschold sums up the situation: "The coal scarcity has made adequate coal reserve of the utmost importance to every manufacturer and its high cost necessitates that the fuel be handled at the plant as economically as possible. This condition has tended to make more general the mechanical handling of coal, for any plant, large or small, cannot now afford to pay the price of manual handling. The attention thus focused on the question of coal handling has resulted in radical changes in the methods employed to store the coal supply and to feed it to the boilers. So effective have been these changes that it would be little, if no exaggeration, to claim that today, a boiler plant for a large manufacturing power plant, exclusive of its steaming equipment, could be erected and furnished with adequate coal storage facilities and equipped with a complete system of conveyor mechanisms for handling coal from the point of receipt at the yards to the furnace grates, for less money than the most efficient layout of ante-bellum days. This, too, in spite of today's high cost of equipment, materials and labor."

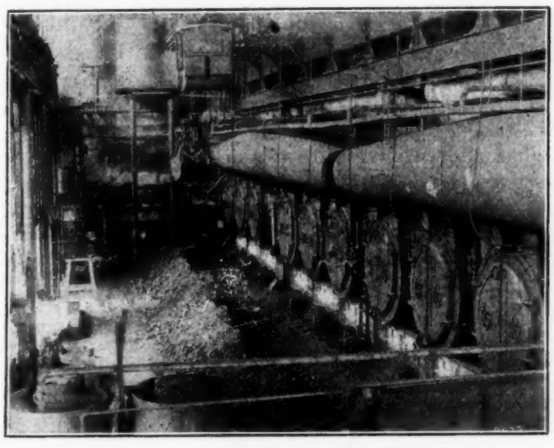


Fig 1.—Grab Bucket Hoist Shown Inside Power House and Placed Where Coal Is Discharged for Firing Boilers.

### Call in an Expert.

Having made out such a strong case in favor of the general handling of coal and ashes by mechanical means, a word of caution is here necessary. When

you come to consider the proposition as applied to your own plant, get the advice of a consulting engineer or engineering firm specializing in power plant design.

I do not mean to be little the advice and suggestions of your own works construction engineer, or the engineering departments of the various conveyor manufacturers, or of the engineers and architects who handle your general building construction.

These men are all apt to have mighty good ideas, and they should by all means be consulted. But, as they are all general practitioners, whereas you need a specialist, the law of averages is decidedly against your getting as good results from their plans, as from those of a man who makes power plant design his chief business.

### Various Methods Employed.

The delivery of coal to the boilers and the removal of ash are usually the largest items of boiler-room expense. The best method of handling coal and ash in any given plant is that which will do the work at the lowest final cost. I use the term "final cost" because insurance of continuity of operations and adequate coal storage are factors which do not appear in a cost-per-ton comparison of methods, but which may have considerable bearing on what may be termed "earning power" of the power plant. (That is, it may be cheaper in the end to install a particular type of handling system, which will cost more per ton to operate, but will insure avoidance of monetary losses caused by shut-downs, due to lack of coal or labor difficulties.)

That the problem of proper selection of method is not easy is indicated by the almost numberless combinations of means and devices to be found in American plants. The principal factors which influence the choice of system are size and location of plant and cost of fuel and labor. The various systems in use may be tabulated as follows:

1. Hand shovelling, without or with wheelbarrow or car.
2. Conveyors
   - (a) Screw or spiral.
   - (b) Flight or scraper.
   - (c) Apron and buckets.
   - (d) Overlapping dump buckets.
   - (e) Continuous belt.
3. Hoists
   - (a) Hoist and hand car.
   - (b) Hoist and automatic cable car.
   - (c) Hoist and trolley telpherage.
4. Cranes
   - (a) Railroad with clam shell-bucket.
   - (b) Transfer with clam shell-bucket.
5. Vacuum System.
6. Combinations of above. (So-called "silo" system, etc.)

### Hand Shovelling.

What are the practical limits of economical hand shovelling? No general answer can be given to this question. Its solution depends upon individual circumstances. It is not necessarily a factor of the number of boilers to be served—for instance, the Burroughs Adding Machine Co., Detroit, finds it economical to employ mechanical coal handling for three boilers, whereas the Mulkey Salt Co., of the same city, serves eight large boilers in a thoroughly efficient manner by hand work. The consideration governing the choice of means in each of these cases was point and manner of delivery, and this is the principal factor to consider.

If coal is dumped from cars or dealers' delivery wagons into bins or on platforms directly in front of the boilers, it is certain that no cheaper means can be devised for hand-fired furnaces. In such instances, one man may handle the coal and ashes and attend to the water level of 200 hp. With hand shaking and dumping grates one man may take care of 300 hp.

In cases where coal cannot be stored in front of the boilers, but must be hauled by wheelbarrow, cart or hand lorry, the practical economic limit of haul is usually 100 ft. and the economic quantity limit 20 tons per day. While this is generally true, it is not a hard and fast rule. Thus Professor Gebhart states: "Hand-fired furnaces and manual handling of coal and ashes are usually associated with small plants of 500 hp. and under, but a number of large stations are operated in this way with apparent economy. A notable example is the steam power plant of the Wood Worsted Mill, Lawrence, Mass., in which 40 return tubular boilers are fired by hand. A tipcart with a capacjty of one ton brings the coal a distance of 100 ft. to 200 ft. to the firing floor, and firemen shovel it onto the grate. Four men are stationed at the coal pile. One man drives two carts (one of which is being filled while the other is gone with its load), sixteen firemen attend to the furnaces, and two men dispose of the ashes.

A good man is capable of shovelling 40 to 50 tons of coal in eight hours when unloading a car, provided it is only necessary to shovel the coal overboard. An average figure for handling coal by barrow and shovel is not far from 2.5 to 3 ct. per ton per yard, up to 5 yd. Above 5 yd. about 0.2 ct. per ton should be added for each additional yard.

Obviously, the first step in any consideration of the installation of mechanical coal handling in a manually served plant is an accurate knowledge of the methods, results, and costs of the hand work which may be displaced. Study your conditions and costs thoroughly. Perhaps you can make comparatively inexpensive changes in your present methods, which will so improve matters that a mechanical installation will seem inadvisable. If no improvement in methods in use, which can be suggested, appears to meet the situation adequately, the time for an intensive study of mechanical systems is at hand.

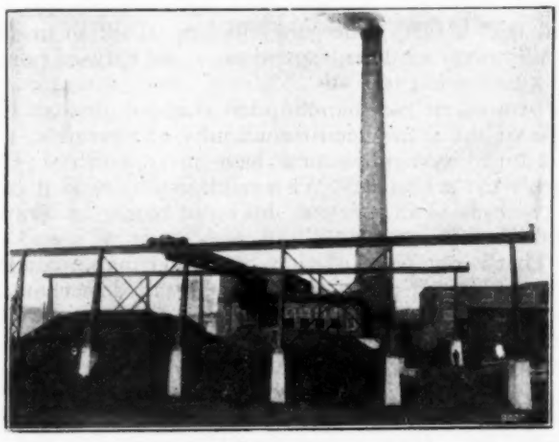


**Fig. 2.—View of Installation Showing Transfer Crane Equipped with Grab Bucket Hoist. This Plan Provides for Future Extension.**

### Conveyors.

Conveyors, like airplanes, are classified as "tractors" or "pushers," depending upon whether they pull or push the load. A third class are genuine

"carriers" since the moving parts bear the weight of the load. Of these general classes the "carriers" are usually more economical of operation and maintenance. Before deciding, however, the characteristics of the various types should be examined.

Screw Conveyors: These are of the "pusher" type, the apparatus consisting of a hollow shaft, attached to which is a continuous spiral of sheet metal.

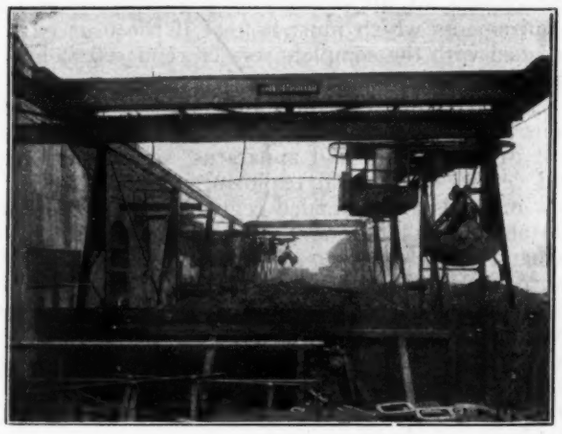


**Fig. 3.—Shepard Transfer Cranes Equipped with Grab Bucket Hoists Over Coal Storage Pile. Coal Shown in Background in Barges and Transferred to Storage.**

This shaft is revolved by means of a motor in a trough of slightly larger diameter than the spiral, with the result that as the operation proceeds, material placed in the trough is worked forward.

Screw conveyors may be used up to 100 ft., and in sections of limited length up to an angle of 15°. Speeds, capacities, and horsepower requirements are approximately as follows:

TABLE I.

SCREW CONVEYORS—HORIZONTAL RUNS.

| Diameter of screw in in. | Highest r. p.m. | Capacity tons fine coal per hr. | Hp. required for each 10 ft. of length (coal). | Capacity cu. ft. ashes per hr. | Hp. required for each 10 ft. of length (ashes) |
|---|---|---|---|---|---|
| 6 | 115 | 6 | .5 | 125 | .5 |
| 7 | 110 | 8 | .6 | 175 | .5 |
| 8 | 105 | 14 | 1.0 | 350 | .5 |
| 9 | 100 | 17 | 1.2 | 425 | .6 |
| 10 | 95 | 22 | 1.6 | 575 | .8 |
| 12 | 90 | 35 | 2.5 | 950 | 1.3 |
| 14 | 85 | 48 | 3.5 | 1,200 | 1.8 |
| 16 | 80 | 80 | 5.6 | 2,000 | 2.8 |
| 18 | 75 | 110 | 7.7 | 2,700 | 3.8 |

Advantages of this type are low first cost, adaptability, and small space required for installation, but these may be offset by high cost of maintenance, due to rapid and excessive wear and tear, by losses caused by breakdowns at important periods, and by the high cost of power to operate.

Flight or Scraper Conveyors: These are of three types, plain, suspended flight, and roller flight. The trough is of any section, but is usually built with greater width than height. Flights which conform to the shape of the trough are attached to single or double strands of chains. Material is usually discharged through gates in the bottom of the trough.

The design of the plain scraper provides for the suspension of the flights from the chain, which drags them along the trough, pushing the load ahead. Crossbars, having wearing shoes at each end are provided with the suspended flight conveyor. The arrangement is such that the flights do not touch the trough at any time. Differing slightly from the suspended type, the roller flight substitutes rollers for the wearing shoes.

As between the three types of flight conveyors, service and maintenance considered, there is not a great deal to choose. The general layout of the plant will usually suggest the type to be employed. In this connection, we will illustrate one or two typical installations of flight and scraper conveyors in the continuation of this article next month.

The power required to operate flight conveyors may be closely approximated by the following empirical equation[1]:

$$Hp = \frac{AWLS}{1000} + \frac{BLT}{1000} + X.$$

in which

$Hp$ = the horsepower required at the conveyor drive shaft.
$AB$ = constants as in Table II.
$W$ = weight of conveyor per ft. of run, lb.
$L$ = distance between centers of head and tail sprockets, ft.
$S$ = speed of conveyor, ft. per min.
$T$ = capacity of conveyor, tons (2000), per hr.
$X$ = 1 for conveyors up to 100 ft. centers and 2 for longer conveyors.

If the conveyor is composed of portions on different inclines compute the power for each section separately and add 10% for each change in direction.

As a general proposition flight conveyors are low priced and offer an economical and efficient means of handling coal and ashes in small plants.

Next month we will discuss other types of conveying apparatus.

[1] C. K. Baldwin. The Robins Conveying Belt Co. quoted by Prof. Gebhart.

*(To be continued.)*

TABLE II.

VALUE OF CONSTANTS IN CHAIN CONVEYOR POWER FORMULAS.

| Angle of Conveyor with Horizontal Deg. | A Sliding blk. | A 3½-in. roller 3½-in. pin | A 6-in. roller 1⅛-in. pin | A 6-in. roller 1½-in. pin | B Scraper Apron and Open Top Conveyors Anthracite coal | B Bituminous coal | B Ashes | B V-Buckets and Pivot Buckets 3½-in. roller ¾-in. pin | B 6-in. roller 1⅜-in. pin | B 6-in. roller 1½-in. pin |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 0.030 | 0.0043 | 0.0046 | 0.0050 | 0.33 | 0.60 | 0.54 | 0.070 | 0.70 | 0.083 |
| 6 | 0.030 | 0.0043 | 0.0046 | 0.0050 | 0.43 | 0.69 | 0.63 | 0.18 | 0.18 | 0.19 |
| 12 | 0.030 | 0.0045 | 0.0045 | 0.0049 | 0.54 | 0.79 | 0.73 | 0.28 | 0.28 | 0.29 |
| 18 | 0.029 | 0.0041 | 0.0044 | 0.0048 | 0.63 | 0.88 | 0.82 | 0.38 | 0.38 | 0.39 |
| 24 | 0.028 | 0.0039 | 0.0042 | 0.0046 | 0.72 | 0.95 | 0.90 | 0.48 | 0.48 | 0.49 |
| 30 | 0.026 | 0.0037 | 0.0040 | 0.0043 | 0.79 | 1.02 | 0.97 | 0.57 | 0.57 | 0.58 |
| 36 | 0.025 | 0.0035 | 0.0037 | 0.0040 | 0.80 | 1.08 | 1.03 | 0.66 | 0.66 | 0.66 |
| 42 | 0.023 | 0.0032 | 0.0034 | 0.0037 | 0.92 | 1.12 | 1.07 | 0.73 | 0.73 | 0.74 |
| 48 | 0.020 | 0.0029 | 0.0031 | 0.0033 | 0.97 | 1.13 | 1.11 | 0.60 | 0.60 | 0.81 |

# HOUSING AND ELECTRICITY SUPPLY IN GREAT BRITAIN.

**Organization and Useful Work of the British Electrical Development Association—Electric Service for Workmen's Dwellings.**

By Our British Correspondent.

We have in preceding issues stated briefly the main purposes for which British electrical interests have set up the Electrical Development Association (Great Britain and Ireland). The director and secretary, J. W. Beauchamp, is now getting down seriously to tackling the big tasks which everybody recognizes lie before him and his committee if the nature and extent of operations are to be appropriate to the peculiar need and exceptional opportunity of the times or in proportion to the present dimensions and the potential greatness of the electrical industry.

The association only came into existence this year and the first task has been to incorporate itself in formal manner and to set about deriving regular revenue from the individual firms and supply authorities. A good deal of useful literature has already been prepared, however, and some of this is now circulating for the purpose of assisting in assuring for electricity a proper place in connection with schemes of national reconstruction. In the following notes, through the courtesy of Mr. Beauchamp, the writer is enabled to indicate in sufficient detail the constitution, aspirations, intentions and some of the performances down to date.

So far as the constitution of the Association Committee is concerned there is no room for question as to representative character. This being so, it might be supposed that there would be no doubt concerning the amplitude of the funds at its disposal, but that is still dependent on a number of unsettled circumstances and if the thing is to be well done, as American readers have full reason for knowing, most generous allocations are essential. The association has been formed "on a co-operative basis to carry out publicity and propaganda work on behalf of the electrical industry, and its committee of management is representatives of the three sections—supply, manufacturing and contracting—which jointly provide the service of electricity to the consumer." These three sections are not equally wealthy, of course, nor have they all the same freedom of action in the disposal of funds for purposes of this kind. What the organized manufacturers may be prepared to do may depend to some extent upon whether other sections standing to gain from publicity and efficient propaganda make reasonably generous contributions. Liberal and prompt financial assistance will enable the organization to secure a recognized position as:

(1) A medium for directing attention to the developments of the industry, their meaning and potentialities for public service.

(2) A means of creating interest in electrical methods and a better public understanding of the relationship existing between the work of the several branches of the industry, and the services rendered by inventors, manufacturers and the public and private enterprises which have brought the public supply of electricity to its present position of importance.

(3) A recognized source of information for press, public and government departments upon those problems which relate more particularly to the uses of electricity, the interests of the consumer, the economic basis of charges and costs, and the influence of controls and restrictions.

(4) A link between the industrial interests concerned and the user of electricity, assisting that coordination of the work of the designer of apparatus and the experience of the supply authority which is essential to secure the benefits of mass production and to avoid waste of effort arising from independent work carried on without full knowledge of the needs and objects of all sections of the industry and the requirements which must be met if the user is to be satisfied with the complete service rendered to him by the manufacturer and supplier.

It is recognized by the committee that urgent questions lie before the industry in regard to reducing the cost of installation and apparatus, simplifying mains and service work, and exploring the possibilities of new methods and amended regulations. These essential objects will follow more rapidly from intensified demand for electricity supply than from any other cause, and money spent on cultivating new and additional business should react to the advantage of the industry and of the consumers, by stimulating the development of new methods and designs and assisting in standardization of apparatus and production in bulk which is needed to meet the increase in cost of all classes of electrical work.

"The prosperity of all branches of the electrical industry must ultimately depend upon the general recognition of electricity supply as a public utility of the first order." At no period in the history of British electrical industry have circumstances been more propitious for a general and organized effort to instill in the public mind a proper appreciation of the part which electricity can take in helping to solve the urgent problems of national reconstruction, which stated generally, consist in: (1) Improving personal health and efficiency. (2) Increasing effective output of all classes of workers whilst reducing personal effort and hours of work. (3) Economizing the natural assets or wealth of the country.

In the association the following are acting in "co-operative organization" for "promoting the public service of electricity supply": Institution of Electrical Engineers; electricity supply undertakings (publicly and privately owned); manufacturers of electrical machinery and appliances; contractors for installation and maintenance of electrical apparatus. It is unnecessary to detail the names of the various associating organizations and their representatives on either the general or executive committees.

The "E. D. A.", as the body is known, did what it could to assist in connection with electrical illumination arrangements for the peace celebrations but the time was so short that it had no real opportunity for showing of what it would have been capable if there had been many months in which to prepare as in the case of coronation celebrations, if there had been no war-time consequences restricting the available supplies of suitable materials, and if there had not existed the disturbing menace of labor unionism unwilling to co-operate.

## Housing and Electric Service.

A direction in which the association may be able to render service of a serious national kind with lasting good both for the public and for the electrical industry is in connection with the vital question of housing. On July 17 this year there were issued "Preliminary Notes on Housing Schemes and Electricity Supply," particularly housing schemes for

working class colonies and garden cities. These notes indicated the points of view from which the subject required to be explored: mains and services, internal wiring, fittings, uses of electricity other than wiring, tariffs, general. This was followed a week or two later by a larger pamphlet: "Housing Construction and Electricity Supply No. 1." It was appropriately illustrated and so written as to inform public authorities, officials, architects and contractors interested in building schemes, and it invited all of these who were interested in the application of electricity supply and electrical apparatus to get into communication with the E. D. A. at Hampden House, Kingsway, London, WC., the central offices.

This pamphlet may be quoted from with profit:

On any important building scheme the supply of electricity, as of water, should be made available before work is commenced.

Artificial light and mechanical power are thus provided for the work of laying out roads, constructing sewers and buildings, hoisting, pumping, sawing, crushing, mixing, and driving workshop machines on the site. Hand labor can be superseded as far as possible; plant situated and driven in positions most suitable for the work in view, and moved from time to time, with resulting economy in labor and haulage of material—all the advantages of a modern factory become available to the contractors without waste of fuel and labor and the noise and dirt inseparable from the employment of portable steam engines. A safe and flexible means of lighting is also provided from the same source, enabling work to be carried on efficiently underground or in dark weather.

Where electricity can be obtained from artificial lighting no other system is likely to be adopted and its influence upon design should be taken advantage of. With this illuminant some reduction may be made in the height of rooms, and consequently in the cost of construction; lamps may be fixed close to the ceilings and advantage taken of their reflecting character to reduce expenditure upon shades and fittings; lighting and extinguishing from any convenient point or several points can be effected, and the provision of small-power lamps over fireplaces, sinks, and in other positions where household work is carried on makes for convenience, helps to reduce accidents and breakages, and simplifies the task of the architect by providing him with a means of lighting which entails no special provision for ventilation—can be used in close proximity to ceilings and walls, is available in any power from a pilot light upwards, can be operated from a distance, does not introduce the use of matches, flame or the risk and dirt inseparable from any other illuminant.

Most of the advantages and conveniences conferred by the use of electricity arise from the ease with which it can be converted into light, heat, or power, without any combustion taking place on the consumer's premises or in his appliances. The whole process of deriving energy from fuel is carried out at the generating works under centralized and economical conditions, concentrating in one place the handlings and burning of coal or other fuel and the removal of its residues. The consumer obtains the results of these operations in the form of electricity which he can convert into light, heat for warming and cooking, power for driving machinery, fans, and the small labor-saving appliances which are developing so freely under the present conditions of difficulty in regard to domestic help.

The expenditure to be incurred on working-class housing schemes is very large and it is worth while to consider the cost of any items of equipment as a percentage of the total cost per house erected. Looked at in this way it will be found that many of the modern appliances and working conveniences put forward in connection with these schemes, although perhaps costing considerable amounts, really increase the total expenditure involved by a very small proportion.

At the present time people will live in any house they can obtain, but when the pressure is relieved by the increase in accommodation they will undoubtedly pick and choose and take into consideration the various factors of position, amenity, and particularly of the internal fittings and the public service provided in so far as those fittings and service reduce their personal labor and add to their convenience.

The houses which are most completely equipped with modern devices for comfort and easy work will attract the better class of tenants who in their turn will help to conserve and maintain those houses and their equipment. There can be no doubt that in houses of the class under contemplation good internal equipment and arrangements will prove as the years go by to be a sound investment resulting in the house being always occupied by good class tenants, and a fair rent obtainable, even when the present rush for accommodation has been overcome.

Particulars have been received of a number of large schemes in which very comprehensive proposals for the use of electricity for lighting, heating and cooking are included. In some of these also provision is made for common supply of hot water from the power station. Such schemes will be watched with interest; however, where something less comprehensive is to be attempted there is still a very strong case for the use of electricity for cooking and heating.

In working-class houses and cottages, one frequently finds that the fireplaces in bedrooms are only used in the event of illness and at other times serve but for ventilation, if they are not closed up, as is often the case.

The necessary ventilation can be provided more scientifically and more cheaply when buildings are being constructed, and if in some of these small rooms the fireplaces and chimney breasts were omitted, the reduction in the cost of construction would be considerable; in some cases sufficient to pay for the whole of the electrical equipment. There appears to be a case for constructing houses of this class without fireplaces excepting in the main living and cooking rooms. These may be provided with stoves adapted to consume coal, coke and refuse, and combined with the hot-water system of the house. If such appliances are properly installed and associated with electric cooking ranges, whilst some of the other rooms are permanently fitted with electric heating, the remainder being equipped with plugs so that portable electric fires can be used in them, the result is a dwelling with many labor-saving features, one in which the cost of maintenance and decoration will be low, the occupants' furnishings will be preserved, and the housework reduced in every possible way.

It would appear that colonies fitted in this up-to-date manner must cost the community considerably less in regard to cartage of coal and ashes, the maintenance of roads, and the work of scavenging. The indirect benefits accruing from a less smoky atmosphere, and a happier and less harrassed community need not be explored here, but that they are real cannot be doubted.

The above information is rounded off with the following impressive statement printed in boldface type:

It is of importance at the present time that everyone interested should cast aside prejudice and the shackles of custom and seize the greatest opportunity that has ever been presented for improving the lot of the small householder, by giving him a dwelling in the design of which the architect and the engineer have collaborated to use the latest appliances available and to prepare and provide for the great development of electrical methods in the household which is now likely to be progressive and continuous.

It will be observed that the E. D. A. has gone into this subject of housing with a thoroughness which augurs well for efficient handling of the many public questions that may ultimately fall within the compass of its operations.

## DRAINAGE DISTRICT BUYS ELECTRIC PUMPS.

Drainage District No. 7, Skagit county, Washington, has purchased the equipment for two pumping plants which will be installed in the vicinity of La Conner, within the next 60 days. One plant, to be placed near the district seawall, will consist of a 24-in. centrifugal pump of the capacity of 20,000 g.p.m., to be direct-connected to a 100-hp., 440-volt motor. The pump will discharge over the seawall against a maximum head of 20 ft. Both pump and motor are the Fairbanks, Morse & Co. manufacture.

The second plant will be installed a mile from the first one and will discharge into a creek channel. This installation will consist of a 10-in. centrifugal pump of 7500 g.p.m., and will be driven by a 40-hp., 440-volt motor, both of which are also Fairbanks-Morse make. Electric energy will be purchased from the central station company.

# Editorial Comment

## Selling the Electrical Idea

IN these rapidly moving days the trend of modern business is to seek results and get them quickly. Custom sets the style, even in business, so we are not easily reconciled to let things take the "natural course of events." Direct rather than indirect results are usually preferred.

At the same time efforts are being put forth to obtain direct results it is good policy to establish means for securing indirect benefit. This is especially true of electrical merchandising. Opening up avenues for future sales is good common-sense business.

Electrical manufacturers and central stations who sell appliances have, as a general rule, appreciated this fact, and the result has been they have endeavored to sell not only electrical devices but the idea of their use. For instance, they have tried to sell the idea of good lighting along with fixtures, the idea of the convenience of electric ranges with the ranges themselves.

This pioneer work done by manufacturers and central stations in building up for future sales has been in a large measure responsible for the impetus given in recent years to the sale of electricity and appliances. It has resulted in nation-wide acceptance of the electrical idea.

Dealers and contractors have contributed largely to the movement, but it is doubtful if they all appreciate their opportunities in this direction. Wiring contractors can suggest the use of appliances; it is not necessary to suggest additional outlets if they prove of real service to the customer. They can help sell the idea of good lighting in industrial plants, offices, etc. In like manner the dealer can pave the way for future business by advancing timely suggestions about the utility of the many electrical devices that prove a boon to people after they have been sold on the idea of their use.

## Distillation of Coal

ELECTRICITY and gas are prone to play a part in which each is of vital interest to the other before many more years have passed. The only pity is that that day is not now. The reason that those days are not with us now is because as a nation we are opportunists, and we do what we find most immediately economical now, and allow that which is most economical in the ultimate to bide its time. And in this we are, like many a politician, selfish, short-sighted and unwise.

Much is said about our conquest of the mysteries of the German chemical industry; that our dyes and drugs are inferior to none and we can produce enough to satisfy the world; that we shall hereafter be independent of the saltpeter mines of Chili, that we can produce all the fertilizer we need and more for intensive horticulture. True, but are we doing these things? More or less, but not seriously, not wholeheartedly, not sufficiently. From the viewpoint of the chemist, from the viewpoint of those who would conserve the nation's coal; from the viewpoint of those who would safeguard the nation's health; from the esthetic, from the economic, from the philanthropic, and from the common-sense viewpoints, we should carbonize our coal wherever possible instead of wasting it as we do so largely at the present time by burning nearly all of it in the raw state.

The war has taught us the value of the by-products of our coal, of those thousand and more products that can be turned to usefulness or into smoke according to whether we use our coal as we should or as we ought not to do. It is almost appalling when we stop to realize that by burning our coal in our houses, in our factories and under our boilers in lumps as we do, we are sending millions of tons of soot and smoke into the atmosphere to injure health, corrode structures and ruin materials where we could, if we would, make the gases distilled from that same coal into drugs, antiseptics and disinfectants, into dyes, fertilizers, oils and many other products required by a world at peace, not to mention those products necessary for waging war.

One of the pressing problems of the day, a problem of readjustment, a problem of reconstruction, a problem of national security, is that of tackling this matter of wasting the most precious constituents of our coal needlessly where we might, if we would, obtain them and still obtain the heat that is being obtained at so costly a price now.

The beehive coke ovens are being replaced by ovens of the recuperative type where the by-products of distillation are recovered for their thousand and more uses. The rate at which this has gone on during the last five years is the one bright page in the history of our waste of coal since we awoke to the fact that coal not properly used is coal gone forever. But this should be only the beginning, a beginning that should act as an incentive for hastened action to utilize the latent by-products of coal that now go to contaminate the atmosphere, lower the efficiency of our boilers and interfere with obtaining the heat that is obtained so wastefully.

The day must surely come when our gas works

will furnish the gas for heating and for steam making, and lump coal will be employed only where it is worthless for anything else—it will be pulverized then, probably. Our cities will be cleaner and healthier then. Our central stations and our gas works will be adjacent, as so many of them are today, but they will be working together instead of in opposition, having learned that each has its own part to play; that there is room for both, and that each needs and can advantageously co-operate with the other.

Of course, such things are not happening now. They are not happening not because it is not desirable that they happen, because it is urgent that they should from every aspect. They are not happening because it would be rather expensive for them to happen, not expensive in the ultimate but now. These things are not happening because it is cheaper for the investor to waste coal now than to save it. But it is to be hoped that public opinion, patriotic spirit and the acumen for which American industry is famed will assert themselves and make the distillation of coal a nation-wide movement.

## *A 220-Kilovolt Bus for California*

CALIFORNIA, it seems, is once again to take the lead in adopting something new, something of vital economic value to the state and something that will have an important bearing upon the utilization of water power. It is proposed that a 220-kilovolt transmission line, which it is suggested should be called a "bus" because that is what it would virtually be, shall traverse the state of California. This bus would connect together a vast number of hydroelectric plants, some now existing and some in the potential stage, and likewise many different widely-scattered markets. By such an arrangement many water powers could be harnessed to advantage, whereas at present it would not be financially worth while to develop them. There are, of course, many other benefits from such a unified system.

One of the statements made by the advocates of this 220-kilovolt bus is that by 1926 the demand upon the unified system would approximate between 1,400,000 and 1,500,000 kilowatts, a demand that almost staggers one, even in these matter of fact days of big things. This is not all, for the bus proposed would extend about 1000 miles. Elsewhere in this issue will be found advanced the reasons for suggesting that a 220-kilovolt bus be made to traverse almost the entire length of California, and the result of weighted conclusions why such a proposal is feasible and appears desirable without loss of time.

Experience with operating the Big Creek line at 150 kilovolts has shown that reliability is equal to that of steam plants of similar capacity located near load centers; in fact the operating history of this line has disclosed no evidence of trouble from the high-voltage system. It has been quite general experience that increasing line voltage brings greater and greater immunity from lightning and similar difficulties so long as the proper precautions are taken in the initial design of the system. Judging from the suggestions of the engineers who look upon a 220-kilovolt bus as the solution of the power problem in California, it would appear that they do not expect any serious difficulty from the high voltage, *per se*, so long as the insulation adopted has a proper factor of safety, so long as generator and the synchronous condenser are treated as an integral unit, and insulator maintenance keeps pace with deterioration.

Another fact worth noting—a fact which, by the way, opens up a very interesting line of thought—is that when operating the Big Creek line at 220 kilovolts corona will occur, whereas the 150 kilovolts now employed is only about 80% of the critical voltage. Operating at the critical voltage will, of course, increase the line loss somewhat, 0.4% normally and during bad weather about 8%. However, this loss is so small as to hardly enter in comparison with the gains that accompany corona loss, which are that a lower factor of safety of insulators will suffice and disturbances due to switching and other causes tending to pile up potential will be more rapidly dissipated, thus reducing system troubles and dangers to apparatus. Incidentally, the corona may be found a valuable agent when it comes to protection.

Heavy investments in transmission lines necessitate high load-factors for maximum return upon the investment. And the higher the load-factor tends to be, the more numerous the markets linked up together. Higher load-factors and the greater the interconnections or linking up, the greater the opportunity for employing large generating units, which means economy in use of water and low unit cost of machines. The Big Creek 150-kilovolt line cost about $6,000,000 to construct. By an expenditure of about 30% more, required to change over to 220 kilovolts, it is claimed the capacity of this line could be doubled. Obviously such an expenditure is worth while.

Almost every feature of the proposed bus strikes one at first as very extraordinary, but the engineers that present the details of the scheme are not promoters nor visionary enthusiasts. They are farsighted enough to plan now for meeting economically the greatly increased power demands of the near future.

Dr. George Otis Smith, director, Geological Survey, pointed out in his masterly address on "Planning for Power" before the N. E. L. A. convention this spring the great desirability of conserving water power, reducing the waste and use of coal by interconnecting and connecting up power plants and power resources on the Atlantic Coast. In veiled words he advocated something similar to this development now advocated for California. We hope that California goes ahead rapidly toward the ambitious scheme proposed and that the states along the Atlantic will give California a strenuous race for the glory of being the first to place in service a 220-kilovolt bus.

# Current Events

## *Electrical Convention Season at Its Height — Gatherings Being Held and Projected in All Parts of the Country*

### EDISON ILLUMINATING MEN ADVOCATE ENDING FREE LAMP RENEWALS.

**Spirited Discussion of Lamp Renewals, Rates and Fuel Marks Annual Convention of Association of Edison Illuminating Companies.**

The thirty-eighth annual convention of the Association of Edison Illuminating Companies was held at the Hotel Griswold, New London, Conn., on Sept. 16 to 18. About 300 members and guests were in attendance, the gathering being quite representative of the long established central-station companies, and including nearly all of the pioneers of the association excepting Samuel Insull, of Chicago, and Joseph B. McCall, of Philadelphia. The three-day gathering comprised a full program of papers and discussions together with an interesting entertainment program including several golf contests as the principal attraction.

In the technical sessions three questions received chief attention, these being retention of the long established policy of free lamp renewals, central-station rates, and the fuel situation. The first of these subjects formed the principal topic for the Tuesday sessions, the discussion being carried over to the evening and continued until after midnight. Both sides of the argument were presented very completely. It was estimated, however, that fully 75% of the association membership is in favor of dropping the policy of lamp renewals and charging full list price for lamps. All of the technical sessions were as usual held behind closed doors and the conclusions reached have at this writing not been disclosed by the publicity committee.

An interesting feature of the meeting was the successful demonstration of radio communication between a naval hydroplane some 2000 ft. in the air and a submerged submarine located at Fishers Island, six miles from the New London harbor. Radiotelephonic communication was freely kept up between plane and submarine and was listened to by a large party of delegates to the convention.

### INDIANA CENTRAL-STATION MEN DISCUSS FACTORS OF INDUSTRY.

**Papers Presented Bring Out Points on Merchandising, Service Connections, Rates, Public Policy and Finance.**

The annual convention of the Indiana Electric Light Association was held at French Lick Springs, Ind., Sept. 11-12. Representatives from a majority of central stations in the state were present and enjoyed a comprehensive program which included papers on such topics as merchandising electric appliances, service extension policies, rates, public utility policies, and financing utilities.

Pres. Thomas A. Wynne, Indianapolis, opened the convention on Thursday with a review of the association's activities and of the progress made by the central stations during the past year. In spite of wartime and so-called reconstruction conditions the load on Indiana central stations is steadily increasing, making it difficult to keep pace with the calls for energy and for line extensions.

The first paper presented was on "Should Central Stations Sell Electrical Merchandise?" by Charles B. Hart, Ft. Wayne & Northern Indiana Traction Co. In view of the fact that central stations, as a general rule, were first to institute the sale of electrical appliances and since their dealings with customers made it natural that they should sell appliances, it was argued that they should remain in the field until dealers were able to adequately handle merchandising alone. The financing of a successful range campaign was also discussed in Mr. Hart's paper, by which it was shown that the proper co-operation between central stations and dealers produced results entirely satisfactory to all.

In his paper on "The Future of Electric Utility Extensions in Indiana," H. O. Garman, chief engineer of the Indiana Public Service Commission, told of the change in policy made by the commission with regard to regulation of extensions of public utility service in municipalities and also the formulation of standards of service. In the past the commission has assumed more or less jurisdiction in these matters, but in the future the municipalities must assume these responsibilities. Referring to service standards he quoted from the new act, which gives municipalities the right to determine by contract or ordinance the quality and character of service furnished, and to require such additions and extensions to the central station's physical plant as shall be reasonable and necessary in the interest of the public. Controversies will be referred to the commission. Mr. Garman quoted proposed rules regarding extensions. These are given in another section of this issue.

"Power-Factor Correction and Its Relation to Electric Power Rates" was the title of an interesting paper presented by R. H. Carlton, Schenectady, N. Y.

At the Friday session J. W. Robb, Wabash Valley Electric Co., Clinton, Ind., read a paper on "Minimum Rates for Residential Lighting," in which he outlined methods of dealing with this class of business.

In a paper on "Public Policy in Utility Operation," E. J. Condon, Indiana Utilities Co., Angola, Ind., brought out points in regard to lowering generating costs and linking transmission lines, educating men in the electrical industry, municipal ownership, public service commissions, rates, water power, and financing public utilities.

Alex R. Holliday, Indianapolis, presented the last paper on the program. It was on "Financing Utilities" and gave comparisons of the purchasing power of the dollar of 1914 and the "dollarette" of 1919 and concluding with statement that the only solution of the

financial problems of the central station will be increased charges to the consumer if they are to receive service commensurate with their needs.

The following officers were elected: K. H. Palmer, Kokomo, president; F. J. Hass, Evansville, vice-president; Thomas Donahue, LaFayette, secretary-treasurer, the last named being re-elected. The following men compose the executive committee: Thomas W. Wynne, Indianapolis; P. J. Ohmer, Elkhart; S. W. Greenland, Fort Wayne; E. J. Condon, Angela; E. M. Walker, Terre Haute, and G. O. Murphy, Indianapolis. J. W. Robb, Clinton; Thomas F. English, Muncie, and M. D. Plain, Hammond, compose the advisory committee. It was decided to hold all future meetings at French Lick Springs.

## MUNICIPAL ELECTRICIANS WILL HOLD CONVENTION IN CHICAGO.

**Papers by Dr. Steinmetz and W. D'A. Ryan Are Features of Program to Be Given Sept. 23-26.**

The twenty-fourth annual meeting of the International Association of Municipal Electricians will be held at the Auditorium Hotel, Chicago, Sept. 23-26. Indications are that there will be an unusually large attendance at this meeting, for which an ambitious program has been arranged. W. D. A. Ryan will present one of the leading papers, his subject being "History of Illumination," which will be illustrated with colored slides.

*Tuesday Morning Session.*—Address of welcome, Mayor William Hale Thompson; response, Dr. Charles P. Steinmetz; president's address, C. E. Diehl; report of executive committee, Jacob Grimm, chairman; report of secretary; report of treasurer; report of auditing committee; appointment of committee on exhibits; appointment of committee on resolutions; address, "Chicago's Novel Fire Alarm System," Wm. G. Keith, commissioner of gas and electricity, Chicago, Ill.; address, "Regulating Motion Picture Theaters," Washington Devereaux, chief of the electrical department, Philadelphia Fire Underwriters' Association, Philadelphia, Pa.

*Tuesday Afternoon Session.*—Address, "Protection for Fire Alarm and Police Signal Circuits," J. Tyler Green, city electrician, Toledo, Ohio; address, "Planning and Layout of Flashlight Signal System." G. F. C. Bauer, inspector, police signal system, Buffalo, N. Y.; address, "Reminiscences of a Superintendent of Fire Alarm Telegraph," Adam Bosch, Wyoming, N. J.; address, "Municipal Electricians in Relation to Electric Power Engineering," Dr. Charles P. Steinmetz, General Electric Co., Schenectady, N. Y.

*Tuesday Evening.*—Complimentary dinner and smoker, Auditorium Hotel.

*Wednesday Morning Session.*—Report of standardization committee, R. A. Smith, chairman; address, "High-Voltage Pole-Line Construction for City Streets," Dr. Morton G. Lloyd, Bureau of Standards, Washington, D. C.

*Wednesday Afternoon.*—Laboratory test of electrical fittings and fire test of wired glass windows at Underwriters Laboratories; fire pump test at Chicago municipal pier.

*Thursday Morning Session.*—Address, "History of Illumination," W. D'A. Ryan, director, illuminating engineering laboratory, General Electric Co., Schenectady, N. Y.; address, "Effective Lighting for Streets," Wm. G. Keith, commissioner of gas and electricity, Chicago, Ill; address, "Relation of Fuses to Knife Switches and Service Wires," E. Zynmeyer, Frank Adam Electric Co., St. Louis, Mo.

*Thursday Afternoon.*—Automobile trip over Chicago boulevards.

*Thursday Evening.*—Dinner, vaudeville and dance at the Congress Hotel.

*Friday Morning Session.*—Address, "Industrial Motion Pictures," F. A. Barron, engineer, wiring sales department, General Electric Co., Schenectady, N. Y.; address, subject to be selected, William F. Devlin, Belden Manufacturing Co., Chicago, Ill.; report of committee on exhibits; report of committee on resolutions; election of officers.

*Friday Afternoon.*—Visit to plant of Kellogg Switchboard & Supply Co.

## PROGRAM OF APPROACHING CONVENTION, AMERICAN INSTITUTE OF MINING AND METALLURGICAL ENGINEERS.

**Ambitious Program, Diversity of Subjects and Many Trips Are Salient Features.**

The one-hundred and twentieth meeting of the American Institute of Mining and Metallurgical Engineers will take place in Chicago during Sept. 22 to 26, the headquarters for the convention being the Congress Hotel. There will be 17 sessions, dealing respectively with non-ferrous metallurgy, mine taxation, coal and gas, geology, milling, industrial organization, iron and steel, oil, sulphur in coal, mining and local resources, pyrometry with special reference to iron and steel metallurgy, symposium on pyrometry.

A number of interesting trips of inspection have been arranged for those members who are desirous of undertaking them. These include a visit to the famous steel plant at Gary, Ind., a tour of the zinc smelters, coal mines, cement works, permanganate works and varied industries around La Salle, Ill.; coal fields at Franklin and Macoupin; the lead refinery and oil refinery at East Chicago and Whiting; many and varied metallurgical plants in vicinity of Chicago and the tungsten and molybdenum reduction plants at North Chicago and Milwaukee, Wis.

The papers of most interest to electrical men are those by H. W. Young on "Outdoor Substations in Connection with Coal-Mining Installations"; "Engineering Features of Modern Large Coal Mines," by C. A. Herbert and C. M. Young; "Electric Resistance Furnace of Large Capacity for Zinc Ores," by Chas. H. Fulton; "Chemical and Electrochemical Problems Involved in New Cornelia Copper Company's Leaching Process," by H. S. MacKay; "Electrolytic Zinc," by C. A. Hansen; "Fundamentals of Pyrometry," by C. E. Mendenhall; "Thermoelectric Pyrometry," by Paul D. Foote; Potentiometers for Thermoelement Work," by W. P. White; "Self-Checking Galvanometer Pyrometer," by H. F. Porter; "Some Factors Affecting the Use of Base-Metal Thermocouples," by O. L. Kowalke; "Resistance Thermometry," by F. W. Robinson; "Resistance Thermometry for Industrial Use," by Chas. P. Frey; "High Temperature Control," by C. O. Fairchaild and Paul D. Foote; "Alloys Suitable for Thermocouples and Base-Metal Thermocouple Practice," by J. M. Lohr; "Temperatures of Incandescent Lamp Filaments," by B. E. Shackleford; "Applications of Pyrometry to Problems of Lamp Design and Performance," by I. H. Van Horn.

The Fifth National Exposition of Chemical Indus-

tries will be in progress at the Coliseum and First Regiment Armory during the same week, and the members of the American Institute of Mining and Metallurgical Engineers are welcomed. On Wednesday a joint session of the above institute and the Electrochemical Society is planned.

## NORTHWEST ELECTRIC LIGHT AND POWER ASSOCIATION TO MEET.

**Program of Twelfth Annual Convention, to Be Held at Seattle, Wash., Sept. 24-27.**

The Northwest Electric Light and Power Association, which is a geographic section of the National Electric Light Association, will hold its twelfth annual convention at Seattle, Wash., on September 24, 25, 26 and 27, in the Press Club rooms. The program, in brief, is as follows:

*Wednesday Morning, Sept. 24.*—Welcoming address by the mayor of Seattle; address by H. J. Gille, president of the association; reports by various committees and other addresses.

*Afternoon.*—Report of technical committee by G. E. Quinan, chief engineer of Puget Sound Traction Light & Power Co., chairman; "Accounting," by J. S. Simpson, of Washington Water Power Co.

*Evening.*—Lecture, "Electricity Today," by Dr. W. H. Easton, of Westinghouse Electric & Manufacturing Co.

*Thursday Morning, Sept. 25.*—Round-table conference on "Improving Electrical Merchandising," L. A. Lewis, of Washington Water Power Co., chairman; discussion to be participated in by speakers, assigned by the chairman, from among central-station men, jobbers, contractors, and dealers.

*Afternoon.*—"Ranges and Water Heaters," a round-table conference, with A. C. McMicken, of Portland Railway, Light & Power Co., as chairman, and J. F. Roche, of Montana Power Co., as vice chairman; all phases of subject will be discussed by other speakers to be assigned.

*Friday Morning, Sept. 26.*—"Value of Public Utility War Experiences and Their Effect on the Future," a paper by W. H. McGrath, of Puget Sound Traction, Light & Power Co.

*Afternoon.*—"Industrial Electric Heating," a paper by C. A. Winder, of General Electric Co. This will include the electric furnace as a feature. It will be followed by the reports of nominating and other committees, and the election of officers.

The closing day will be devoted to a large extent to trips of inspection and entertainment.

## PRESIDENT BALLARD OF THE N. E. L. A. STARTS ON TOUR OF COUNTRY.

**Will Attend Conventions of New England and Southeastern Sections and Committee Meetings in New York and Chicago.**

President R. H. Ballard of the National Electric Light Association left Los Angeles, Cal., Sept. 12, on a second eastern trip in the interests of the organization. He will attend a meeting of the Public Policy Committee, which has been called by Chairman John A. Britton, to be held at Association headquarters in New York on Oct. 1. Both Mr. Ballard and Mr. Britton will be in attendance at this meeting. A meeting of the Executive Committee is called for Oct. 2, when the Southern California city, at which the convention of 1920 will be held, will probably be selected; and a general meeting of the Committee on Geographic Sections which has been called by Chairman R. F. McClelland, and Vice-president Bump on Sept. 29. It is expected that this meeting will be in session for two days, as the general question of dividing the country into geographic sections will be taken up and thoroughly discussed, and some definite program will be agreed upon.

Taking advantage of President Ballard's presence in the East, a general meeting of the Membership Committee has been called by Chairman Walter Neumuller of New York, and of the Company Sections Committee by Chairman Frank A. Birch of Philadelphia. Both of these meetings will be held in New York.

Conferences have been arranged between President Ballard and Vice-president M. R. Bump, of New York, and Chairman I. R. Moultrop of Boston, on affairs relating to hydroelectric generation and technical sections; with Vice-president Walter H. Johnson, of Philadelphia, and Chairman John G. Learned and George B. Foster, of Chicago, on matters connected with the Commerical and Electric Vehicle Sections, and also with Vice-president Frank W. Smith, of New York, and Chairman R. W. Symes, of Detroit, concerning matters appertaining to the Accounting Section.

Mr. Ballard will stop in St. Louis on Sept. 15 for a discussion of Association affairs in that section of the country with company executives residing in that region.

The convention of the Southeastern Section will be held at Asheville, N. C., Sept. 17 to 19. President Ballard will address the convention on the morning of Sept. 18.

The convention of the New England Section will be held at New London, Conn., Sept. 22 to 24. President Ballard will speak at the banquet on the evening of Sept. 23.

At the close of the New England convention he will return to New York arriving there the evening of Sept. 24, and plans to be at headquarters for the following two weeks.

Returning to the Pacific Coast in October, President Ballard's tentative itinerary provides stops at Detroit, Chicago, Minneapolis, Butte, Seattle, Portland and San Francisco.

## COMPREHENSIVE PROGRAM ARRANGED FOR INSPECTORS' CONVENTION.

**Topics of Interest to All Branches of Electrical Industry to Be Discussed at Springfield, Mass.**

A tentative program for the reconstruction convention of the National Association of Electrical Inspectors, which is to be held in Springfield, Mass., Oct. 13-14, has been completed. It consists of a number of forums which will be led by men who have made a life study of the subjects assigned to them.

These subjects will concern the personal accident and fire hazards and will be of interest, not alone to electrical inspectors, but to fire, life, accident, liability, casualty and compensation insurance interests, electrical transmission companies, electric light and power companies, electrical contractors and wiremen, water companies, fire departments and municipal officials. They will be for the single purpose of explaining how electrical hazards may be safeguarded and will be open for a liberal discussion on the part of all who

may attend. For this reason a general invitation is extended to the allied electrical interests to be present and take part in the proceedings.

The Hotel Kimball will be the convention headquarters and those intending to be present are urged to make early reservation for hotel accommodations. The Chamber of Commerce of Springfield is sending out letters, accompanied with a list of the hotels in Springfield, together with the prevailing rates. The banquet committee announces that ladies will be permitted to attend the banquet, which will be held Monday evening, Oct. 13.

PROGRAM.

Opening of the Convention—Allen W. Hopkins, past president, Western New England section, National Association of Electrical Inspectors.

Address of Welcome—Hon. Arthur A. Adams, mayor of Springfield.

Response—Washington Devereux, president, National Association of Electrical Inspectors.

"The Beginnings of the National Electrical Code," F. Elliott Cabot, the first chairman of the electrical committee.

"Radio Developments and Their Relation to the Code," Clarence D. Tuske.

"Electrical Inspections and the Electrical Contractor," J. S. Smith, Philadelphia.

"Electrical Inspections and the Power Company," P. H. Bartlett, engineer of installations, Philadelphia Electric Co.

"Electrical Inspections and Their Value to the Fire Insurance Interests," Ralph Sweetland, secretary of the electrical committee.

"Some Code Problems of Present Interest," Dana Pierce, chairman of the electrical committee.

"Insulating Joints—What of Their Future?" Joseph C. Forsyth, Board of Underwriters, New York City.

"High-Potential Wiring," G. C. Lawler, electrical engineer, Associated Factory Mutual Fire Insurance Companies, Boston.

"The National Electrical Safety Code," M. G. Lloyd, Bureau of Standards.

"A Uniform Type and Design of Attachment Plugs—Is Such a Device Needed and Is It Possible to Achieve?" speaker to be announced.

"Polarization and Protective Grounding," W. J. Canada, Stone & Webster, Boston.

"Interbuilding Service Connections," H. S. Wynkoop, Bureau of Gas and Electricity, New York City.

"The Visual Marking of Fuses," Thomas H. Day, past president National Association of Electrical Inspectors, Hartford.

There will be a session, for members only, the morning of Oct. 15, the room and time to be announced during the convention. All other sessions will be open.

## THIRD EDITION OF MANUFACTURERS' ACCOUNTING SYSTEM READY.

**Standardized Accounting and Cost System Prepared by Joint Committee of Electrical Manufacturers Now Widely Used.**

Joseph C. Belden, president of the Belden Manufacturing Co., Chicago, Ill., and a member of the Committee on Standardized Accounting and Cost System of the Electrical Manufacturers' Council, announces the following in reference to this system:

"The third edition of the Manual of Standardized Accounting and Cost System of Electrical Manufacturing Industries will be issued about October 1. In 1916 the Electrical Council appropriated funds for this work and appointed a committee consisting of executives and accountants from 15 representative manufacturing companies which has done a large amount of work since then.

"This manual is really a complete specification of modern factory accounting on practical lines. Standard rates of depreciation and methods of charging depreciation into costs are given. The correct manner of handling experimental and development charges is given and charges are segregated so that only proper overhead gets into costs. Comprehensive definitions are given throughout.

"The importance of correct accounting is today clearly recognized and 80 electrical manufacturers are now using this system. It can be used by any electrical manufacturer, regardless of size. Edwin M. Hurley, former chairman of the Federal Trade Commission, and Secretary Wilson of the Department of Commerce have both officially endorsed this system."

This manual is sold only to electrical manufacturers. Members of the Associated Manufacturers of Electrical Supplies, Electrical Manufacturers' Club and the Electric Power Club can obtain the manual of this system for $2.00, and other electrical manufacturers for $2.50. Address S. L. Whitestone, General Electric Co., Schenectady, N. Y.

## INDIANA COMMISSION FORMULATES RULES FOR EXTENSIONS.

**Rules Proposed to Eliminate Unreasonable Demands of Consumer and Unfair Refusal of Extensions by Utility Companies.**

The Indiana Public Service Commission has formulated new rules which are proposed to govern extensions of electric utility service. These rules, which are given below, are to be used as guides for municipal governments in handling these matters and are indicative of the commission's attitude when ruling upon such when brought to it on appeal.

*Jurisdiction.*—The Indiana Public Service Commission law contains the following provisions:

> "Sec. 110. Every municipal council shall have power, . . . . to require of any public utility by ordinance or otherwise such additions and extensions to its physical plant within said municipality as shall be reasonable and necessary in the interest of the public, and to designate the location and nature of all such additions and extensions, the time within which they must be completed and all conditions under which they must be constructed subject to review by the commission . . . . ."

In the matter of extensions of facilities for utility service the commission exercises only appellate jurisdiction. In case of appeal to the commission it will be guided somewhat as outlined in the following paragraphs.

*Free Extensions.*—Each utility should upon written request for service by a prospective consumer or a group of prospective consumers located in the same neighborhood, make free of charge a line extension necessary to give service and furnish free service connection when the income for the first year from the prospective consumer or consumers is equal to

one-third (1/3) to one-fifth (1/5) the direct cost of the extension.

*Extension Above Free Limit.*—If the line extension required in order to furnish service at any point within the corporate limits of any city or village, or for any adjacent suburb of a city or village, is greater than the free extension specified above, such an extension should be made under the following conditions: The utility may require a deposit of the cost of the extension above the free limit and should, in such a case, refund an amount equal to the cost of the free main extension for each additional consumer whose service shall be taken off of the entire extension within a period of ten years from the making of such an extension, but at no time shall the rebate made exceed the original deposit. If the extension is of such length and the prospective business which may be developed by it is so meager as to make it doubtful whether the business from the extension would ever pay a fair return on the investment, the facts may be reported to the commission for investigation and determination as to the reasonableness of such extension. If at any time the utility desires to purchase an extension to its distribution system which was built in whole or in part, by the consumer or consumers it may do so, subject to the approval of the commission, after making payment of a fair and reasonable price fixed by the commission, due allowance being made for depreciation and previous payments made thereon.

This rule shall not be construed as prohibiting any utility from making free extensions of lengths greater than above specified, or from providing a method of return of deposits for extensions more favorable to consumers, so long as no discrimination is practiced between consumers whose service requirements are similar.

*Contract for Service.*—Utilities should not be required to make line extensions as described in this rule unless those to be served by such extensions shall contract to use the service for at least two years.

Example: Assume a proposed $800 extension. Assume that we have 10 consumers who will pay at least $18 per year each, 10 times $18 times 5 equals $900 in five years. This extension will pay and should be made free of charge, because the estimated revenue in five years exceeds the direct cost of the extension. Now if we do not have ten consumers, but only two, namely, A and B, the revenue from them for five years at $18 each equals $180. It is seen that this proposed extension would not be remunerative and if constructed would become a burden to the older consumers, and if there were too many of such non-remunerative extensions then the rates would have to be raised. If, upon investigation, it appears that this extension would ultimately have to be made but that it would require a period of ten or twelve years to become remunerative then the utility should make the extension if the proposed consumers will deposit with the utility at 6% interest an amount equal to the direct cost of the extension less what the proposed now consumers are entitled to as a free extension.

Example: Assume the proposed extension will cost $800. A and B wish to be consumers at $18 per year each, $18 times 2 times 5 equals $180, or A and B are entitled to $180 of free extension, they therefore make a deposit of $800 minus $180 or $620 with the utility at 6% interest. Suppose at the end of the fifth year C comes on at $18 per year the utility will pay back to A and B each one-half of 5 times $18 or $45. The utility now has three consumers, A, B and C, and a deposit of $530. At the end of the sixth year assume D comes on as a consumer at $18 per year, he like the others is entitled to $90 of free extension, so the utility pays again to A and B each $45, so the utility now has 4 consumers, A, B, C and D, and a deposit of $440. At the end of the ninth year assume E and F come on at $18 each per year and they are also entitled to their free extension of 2 times 18 times 5 equals $180, so the utility takes on E and F and pays A and B each $90, reducing the deposit to $260, and has connected consumers A, B, C, D, E and F. At the end of the ten-year period assume that no additional consumers come on, then the utility pays to A and B what interest remains due to them at 6% and keeps the $260 remaining of the original $800 deposit as part compensation to the older consumers and the utility for making an extension which was not remunerative during its earlier days.

No extension should be made where it does not give promise of being compensatory some time.

## CHICAGO ELECTRIC CLUB TO MEET AT ELKS CLUB.

At a meeting of the Board of Managers of the Electric Club of Chicago, held on Sept. 8 it was decided to change the place of the Club's weekly meetings from the Hotel Sherman to the Elk's Club where excellent facilities are available for such luncheons. The day of the regular meeting was also changed from Thursday to Tuesday.

The first meeting in the new location was held on Sept. 16 at which John J. Garrity, general superintendent of police of Chicago, was the principal speaker.

The Electric Club has been holding its meetings at the Sherman for a number of years.

## ELECTRIC CLUB TO BE A FACTOR OF CHICAGO ELECTRICAL SHOW.

At the Chicago Electrical Show, to be held at the Coliseum, Oct. 11-25, the Electric Club of Chicago will have a booth at which it will maintain a general information bureau as well as a registry center for out-of-town guests. Those in attendance at the booth will be ready to offer whatever service they can to visitors who should register.

One day of the show is to be called "Electric Club Day" and the club's regular meeting will be held in the Coliseum on that day. Samuel Insull will be the speaker.

## TO HOLD INTERNATIONAL TRADE CONFERENCE AT ATLANTIC CITY.

Plans have been made by the Chamber of Commerce of the United States for an international trade conference at Atlantic City, N. J., Sept. 30. Business representatives from all over the country and from England, France, Italy and Belgium will meet to discuss problems of domestic and foreign trade.

## CHICAGO ELECTRICAL CONTRACTORS HAVE FIELD DAY.

The Electrical Contractors' Association of Chicago held a field day at the new Evanston Golf Club on Sept. 18. The day was largely devoted to golf, there being no meetings scheduled. Manufacturers and jobbers were also in attendance.

# Commercial Practice

## *Home Economy Bureau — Contracts for Rural Lines—Irrigation Service in Montana — Other Commercial Events*

### LOUISVILLE UTILITY COMPANY INAUGURATES HOME ECONOMY DEPARTMENT.

**Louisville Gas and Electric Co. Adopts Co-operative Bureau for Housewives.**

A new field of activity has been opened for the commercial department of the Louisville Gas & Electric Co. with the inauguration of its Home Economy Bureau. The innovation will be in charge of Miss Grace Otter, under the supervision of Robert Montgomery, manager commercial department of the company, who is responsible for the idea. Miss Otter is a graduate of the Kentucky College at Danville, has completed a course in home economics and is a specialist in dietetics.

If a Louisville housewife finds herself confronted with a dinner or luncheon party and a lack of ideas as to menus, table arrangements, or the proper way to cook a dish she need only telephone Miss Otter who will immediately respond with suggestions and will lend every possible assistance to make the affair a success. If a housewife is puzzling over the problem of relative food values with an eye to economy or health, the home economy bureau will solve her problems upon request.

If it is a problem of house management, for example, the task of finding the simplest and easiest way of arranging the housework, or the quickest and best way to wash the clothes or iron them, or to clean house or cook a meal, Miss Otter and her bureau is available free of charge to assist the housewives of Louisville and vicinity.

The home economy bureau will be fitted up with all the important gas and electric labor saving appliances for demonstration purposes. A series of newspaper advertisements have been started in the Louisville daily papers concerning the "New Service." These include feature photographs of Miss Otter demonstrating various appliances, and invite requests for her new booklet "Economy Helps for the 20th Century Housewife, with Tested Recipes." The booklet contains besides menus and recipes, many suggestions for the saving of money, time and labor in household management.

### CONTRACT SUITABLE FOR FARMERS' LINES.

**Form of Agreement Used for Farmers' Co-operation in Construction of Farming Community Lighting and Power Lines.**

The accompanying agreement for the use of farmers requiring the construction of a transmission line through their properties by the central station is one that has been drawn up and found very satisfactory by the Greenville Electric Light & Power Co., of Greenville, O. According to D. L. Gaskill, president of the company, this agreement answers the purpose admirably, since it covers the construction of the line, provides for the equitable payment by the various subscribers to the line and takes care of the disposal of the line after its construction.

AGREEMENT.

In relation to the construction and use of an electric transmission line extending from the 2300-volt distribution line of.....Company, on..... in ....., on and along the following territory: (Describe route).

Whereas, a considerable number of residents along the above described road in ..... Township, of ..... County, desire to use electric current for supplying their homes and buildings,

And, whereas, it is necessary that such line be constructed at the expense of those who desire to use said current,

It Is Therefore Agreed to by the signers to this instrument that such line shall be constructed upon the following terms:

First. The construction of said line and the making of the contract therefor shall be placed in a committee of three of the shareholders hereto, and which committee shall have full power to make contracts and look after all things necessary in the construction of said line. Such committee shall keep account of all the cost of the construction of said line and shall collect the sums necessary from each of the shareholders hereto to pay the entire cost of construction of said line, the same to be divided equally among shareholders in proportion to the number of shares for which he subscribes and owns.

Second. The line to be constructed shall be capable of transmitting 2300-volt single-phase 60-cycle electric current and shall be of sufficient capacity to serve all of the residents along the highways in which such line is constructed. All material and the plans and specifications for said line and the construction of said line are to be subject to the approval of and to be of the kind specified by The..... Company, of .....

Third. It is understood that this agreement shall cover only the 2300-volt transmission line and shall not cover transformers or service lines to serve any of the shareholders to this agreement, each shareholder being required to provide his own transformer and service line from the 2300-volt transmission line herein provided for. Payment for the construction of said 2300-volt transmission line to be made as follows: 50% of the estimated cost thereof to be paid to the committee before the work is undertaken; 25% to be paid to the committee when the poles are erected, and the balance upon the completion of the line.

Fourth. It is further understood and agreed that upon said line being completed a bill of sale for the entire line, not including transformers and service lines, but to include the 2300-volt transmission line only, is to be made out and turned over to The ..... Company, the consideration for which transfer of ownership of said transmission line to be that The ..... Company shall maintain said line and assume full ownership of the same from the time of its completion and the turning over to it of said lines and to be responsible in every way for the ownership of said line the same as if it had originally constructed it.

Fifth. The committee in charge of the construction of said line shall keep an accurate account of the entire cost of the same and such cost shall be apportioned equally among the shareholders hereto in proportion to their shares, and in case other shareholders are created within ten years from the date of the construction of said line along the highway then such users of current from said line shall pay to the committee in charge of the shareholders' interest an amount

equal to the amount which was paid by each shareholder originally in the construction of said line and the committee in charge of such collection shall pro rate to the original shareholders equally in proportion to the shares held by them any amounts that may be received from subsequent users on said line.

Sixth. It is understood that the share spoken of in this agreement applies to the property rather than to the individual and that in case any shareholder shall dispose of his real estate such right to the use of said line shall pass with the real estate to the subsequent purchaser thereof. It is further understood and agreed that The ..... Company, in addition to approving the plans and specifications and construction of said line, shall have the right to extend such line from its terminus to points further beyond without objection or hindrance from the respective shareholders to this agreement.

Seventh. It is understood that the signing of this agreement by us constitutes a contract between the signers and the balance of the shareholders to carry out the terms of this agreement and by signing of the same we do hereby bind ourselves, our heirs, administrators, and assigns.

In Witness Whereof, We have hereunto set our hands this ..... day of ....., 19...

Name..... No. Shares.....
Name..... No. Shares.....
Name..... No. Shares.....

## WIRING OLD HOUSES PROGRESSING STEADILY IN BOSTON.

**Statistics to July Show Satisfactory Progress—Revenue Expected.**

For the month of July 47 wiring agreements were signed for wiring of houses already built without wiring, by the Edison Electric Illuminating Co. of Boston. These contracts represent about 52 kw., with an estimated income of $1160. The total cost of this wiring amounted to $7881.25 or an average per house of $167.68.

For the four months ending July 31, 271 house-wiring agreements were signed, totaling 263 kw. and an estimated income of $6384. The total wiring expense was $37,716.16, or an average of $139.17 per house. The above contracts were distributed among 36 contractors, the highest contract amounting to $14,155.50, the second highest to $4274.81 and the third highest to $2700.90.

The above only serves to emphasize the very great help that utility campaigns are to the local contractors where the campaign is carried on. Moreover, the value of co-operation of utility and contractor-dealer should be obvious to all those who have at heart the mutual welfare of these two forces in the electrical industry.

## IRRIGATION IN MONTANA IS PROVING A PAYING PROPOSITION.

**Service from Mountain States Power Co. Brings Farmers Big Revenue.**

The subject of irrigation is receiving more and more attention in Montana. Recently an investigation trip was made in the Flathead Valley district by business men, farmers and others interested in increased crop yields under the auspices of the Kalispell Farm Bureau. A number of farms which are irrigated by means of electric power furnished by the Mountain States Power Co. were visited. It was shown by W. B. McDonald, manager of the Kalispell Division of the company, who accompanied the party and explained the advantages of electric power pumping, that at an expense of approximately $14.00 per acre (depending on the size of the farm) an electric irrigating system could be installed which would insure an abundant supply of water at all times. It was further shown that the increased crops as a result of the irrigation more than pay for the installation in a single year. In one instance two crops of alfalfa brought the owner $100 per acre. An editorial in the Kalispell Interlake of August 25 is quoted:

"Today a well known local farmer who has been practicing irrigation for several years, makes the statement that returns from his alfalfa fields will this year yield returns equivalent to going rates of interest on land valued at $1000 per acre.

"This isn't a theory but a fact determined by actual practice. Of course, prices of hay are high this year and have been for the past three years, but even in an average season it has been found that the plant has paid a big return on the investment."

## NORTH DAKOTA FARMER ENTHUSIAST FOR UTILITY SERVICE.

**Threshing and Other Work All Done Electrically on Fargo Dairy Farm.**

According to M. L. Hibbard, manager, Union Light, Heat & Power Co., Fargo, North Dakota, there are a number of farmers in his territory who have found central-station service so beneficial as to become enthusiastic regarding its convenience, its reliability and low cost when such factors as readiness to serve, availability, lack of trouble are taken into consideraion.

Mr. Hibbard cites one farmer in particular, A. D. Scott, who operates a large dairy farm about two miles southwest of Fargo. This farmer is doing his entire threshing with electric power, and for the past two years had done most of the work around the farm electrically. It is found that the work can be done for much less cost when done electrically than when done in any other way attempted.

## GROWTH OF NEW BUSINESS IN MINNEAPOLIS UNPRECEDENTED.

**Minneapolis New Business—Power Output Increased 23.8 Per Cent.**

The new business being connected to the lines of the Minneapolis General Electric Co. in Minneapolis is increasing at an unprecedented rate, according to reports coming from Minneapolis. Total contracts for the week ended August 29 numbered 80, with 751 kw. of lighting and 268 hp. in motors—a total of 1269 hp. for the week. Connected load gain (net) included 204 customers with 161 kw. of lighting and 128 hp. in motors. Appliance sales 97. Electric energy output was 33.8% greater than for the same week of 1918. For the year to date it is 23.8% ahead of the same period last year.

## WATER POWER IN JAPAN.

In common with other countries, Japan is making a survey of its available water power. The investigation, which began in 1918, will be completed in about five years, and all power sites where there is a prospect of more than 1000 hp. being developed will be fully investigated. It is stated that at present about 1,000,000 hp. are being developed, while 2,000,000 hp. are awaiting exploitation.

# Operating Practice

## *Fighting Turbogenerator Fires—Coal Consumed by Banked Fires — Combustion of Coke — Economizer Maintenance*

### COMPANY OPINIONS AS TO MEDIA FOR FIGHTING TURBOGENERATOR FIRES.

**Water Finds Greater Favor Than Steam Among Thirty Operating Companies.**

A number of central-station companies have quite recently, during the last two years, adopted some definite method of fighting internal fires in their turbogenerators, recognizing that this form of apparatus does catch fire and once afire may be difficult to extinguish.

With the advent of permanently-installed fire extinguishing provisions in generators, the use of steam has received very serious consideration, and there is at the present time a wide difference in opinion as to the relative merits of water and steam for this purpose. Of the thirty companies reporting to the Committee on Electrical Apparatus, N. E. L. A., the use of water is definitely favored by nine and opposed by eight, and the use of steam favored by seven and opposed by twelve. Eighteen generators of four companies are now provided with permanent steam equipment, as against nine units of three companies with water equipment.

The principle of operating in using steam differs from that in using water primarily in that displacement of air in the generator by steam is very largely depended upon to smother the fire. It is extremely important, however, in using steam to shut off the supply of air to the generator as completely and promptly as possible, and some means of facilitating this operation should be provided. It would seem that the air damper could be placed more effectively in the outlet rather than the inlet wherever the design permitted. The wetting of the generator windings from condensed steam may also be helpful. In using water, the idea is to wet the windings as far as possible, this being aided by the natural ventilation of the machine.

### EXPERIENCES OF COUNTIES GAS & ELECTRIC CO. WITH COAL CONSUMED BY BANKED FIRES.

**Influence of Careful Operation Upon Coal Consumption Shown by Actual Tests.**

The coal consumed by banked fires acts to materially increase the coal consumption of a plant compared to the coal consumption as based upon water evaporated at so many pounds of water per pound of coal. As a matter of fact, many of the smaller companies do not realize the large amount of coal used up for banking fires, nor do they appreciate the importance of making the bank carefully and the proper adjustment of dampers.

In a very interesting paper entitled, "Economical Boiler Room Operation for Medium Sized Plants," presented before the Pennsylvania Electric Association recently by Henry B. Bryans, chief engineer, Counties Gas & Electric Co., figures were presented to show what amount of coal was being consumed by banked fires at this company's generating station. The station uses underfeed stokers with high-grade, low-volatile bituminous coal. There are 13 boilers of a total capacity of 5420 b-hp.

Tests made by this company show that on a Sunday when fires may be banked for 24 hours, the coal consumed by a banked fire may reach as high as 18%. A careful investigation was made, and among others the following results covering the banking of two batteries of two 500-hp. boilers may be of interest. The period is for 24 hours:

| Boiler numbers. | Fuel used | | |
|---|---|---|---|
| | Total amount, lbs. | Rate per boiler hp. per hr. in lbs. | Rate per retort per hr. in lbs. |
| 8 and 9..... | 5,405 | 0.23 | 19.0 |
| 11 and 12..... | 8,000 | 0.33 | 27.0 |

It will be seen that it took almost 50% more fuel to bank the second battery than it did the first. Investigation revealed the fact that dampers were not closed as tightly as indicated from outside of the breaching and also that one damper was badly warped and could never be closed. These conditions were corrected and the standby losses were materially decreased.

### EXPERIENCES IN THE COMBUSTION OF COKE UNDER BOILERS.

**Experiences Obtained in Germany During the War Indicate Measures Necessary for Success.**

Experiences in the burning of coke under steam boilers are related in the February 28 issue of Zeitscrift fur Dampfkessel and Maschinenbetrieb. It is pointed out that a clear distinction should be made between gas coke and metallurgical coke. Gas coke is easier to ignite because its structure is less compact, while coke from coke ovens, especially that made from fat coals, has a compact structure and is less easy to ignite.

When burned, coke keeps the shape of the lump longer than coal; it is more difficult to bring to the state of incandescence, but it burns slower. It does not give off its heat with the same speed as coal and because of this, in order to burn the same weight of fuel one has to employ a larger grate and use a deeper fuel bed; its lower specific weight as compared with coal also makes a larger grate necessary.

The size of the lumps is essential. If the lumps are too large, the surface subject to the action of the air is too small to maintain the combustion process, if the draft remains within the same limits. The limits of size are indicated by the author as 0.4 in. minimum to 1.6 in. maximum.

The finer sizes, and in particular coke breeze, make too dense a layer and with ordinary draft do not provide for a sufficient contact with the air. Their com-

bustion on a plain grate is possible only when special appliances are used.

As a rule, coke requires a stronger draft, which is due to the greater depth of the fuel bed and the resulting increased resistance to the flow of air.

It is a fact that with coke a boiler cannot deliver as much steam as with coal, especially when working at overload. This is due to the unsatisfactory flame formation resulting from the lack of volatile compounds (1 to 2% in coke as compared with 20 to 30% in coal) and also to the slower combustion of coke equivalent to a lower grate output. Hence, when it is impossible to increase the grate area, the output of steam is apt to fall off.

Likewise, lower superheater temperatures have to be taken into consideration, as the exhaust gases enter the superheater at a lower temperature than when coal is used, due partly to the shorter flame and partly to greater excess air.

Coke firing makes greater demands on the fireman. It is recommended that in large plants those boilers that carry normal load be fired with coke, while the peaks of the load curve should be taken care of by boilers equipped for mixed or straight coal firing.

As regards the grate construction it was obvious that the traveling grates designed for coal would not do for coke. This problem was solved by subjecting the coke to a generator action. This means that the coke was brought to a bright glow in a separate hopper and from there delivered on to the traveling grate in a layer from 1.31 to 1.64 ft. deep, depending on the size of the coke. On the grate the coke was burned in a gradually decreasing depth, Fig. 1. At the end of the grate slag pockets were provided to prevent too much air from entering.

That the combustion should go on properly, it is important to maintain a powerful fire in the lower part of the auxiliary hopper, the purpose of which is to ignite the mass of coke lying above it. A sort of hearth is employed, so arranged that it has nothing to do with the advance of the fuel toward the traveling grate proper, but lies more or less at rest on an inclined grate (Fig. 1) while the fuel for the traveling grate moves over it. In this connection, the angle of inclination of the inclined grate is of material importance. If it is placed at too sharp an angle, the purpose desired will not be achieved and the fuel layer from the contact hearth will be carried away by the moving mass of coke, which will result in stopping the ignition of the coal in the hopper and "freezing" the latter.

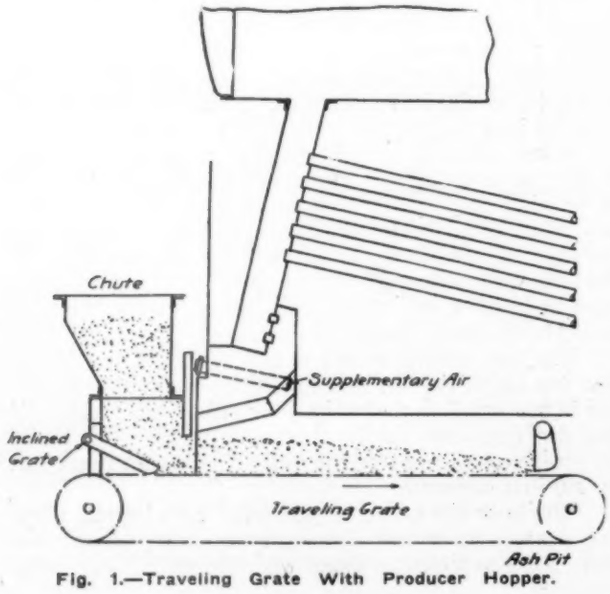



Fig. 1.—Traveling Grate With Producer Hopper.

The producer action of the auxiliary hopper, together with the deep layer of fuel, favor the production of carbon monoxide and hence flame formation, which is highly desirable. In order, however, to bring about a complete combustion of the gases, it is necessary to admit fresh air directly into the combustion space, which can be done most simply by means of tubes passing through the fire arch.

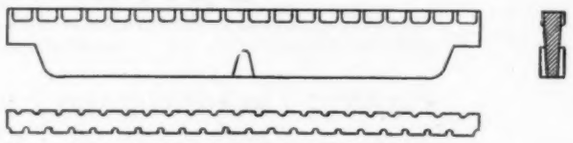


Fig. 2.—Nozzle Grate Bar.

Experience shows that operating boilers at high ratings leads to an excessive wear of the grates, which cannot be maintained for any length of time. On the other hand, it appears that coal-firing installations can be converted to coke firing with comparative ease by the employment of steam jets as auxiliaries in the production of draft.

This arrangement can be used particularly well with fine coke, when either a grate with small interspaces may be used or, preferably, a so-called nozzle grate bar designed substantially as shown in Fig. 2.

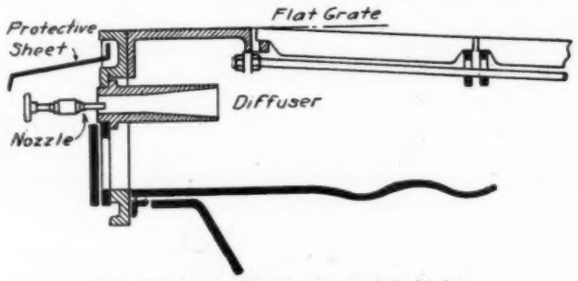



Fig. 3.—Steam-Nozzle Underfed Stoker.

In order to raise the air pressure under the grate the steam nozzle is led into the smaller end of a conical tube, a diffuser, whereby the air compression is raised from 0.6 in. to 0.8 in. of water. As shown in Fig. 3, the air suction occurs through the ring-shaped space between the nozzle and the tube. In accordance with the size of the furnace, one or more nozzles may be used side by side.

## MAINTENANCE COSTS OF ECONOMIZERS A SMALL MATTER.

The economizer is finding rapid application in power plants since the fuel economy accompanying its use comes to be better appreciated. Central stations where the load-factor is relatively high, where higher steam pressures are in vogue and high rates of steam making are employed and special attention is being given to economical use of station auxiliaries, especially are taking to the economizer.

In some quarters there seems to be a misapprehension as to the cost of economizer maintenance. As a matter of fact the cost of maintaining economizers has been found to be remarkably low. One of the largest economizer manufacturers recently made the statement that covering one million dollars' worth of economizers, the average cost of maintenance for the first ten years was believed to be well under one-half of one per cent of the investment.

# Contractor-Dealer

## *Suggestions for Boosting the Sales of Electric Sewing Machines — Details of Window Displays Deserve Attention*

### SPEEDING UP SALES OF ELECTRIC SEWING MACHINE MOTORS.

**Timely Suggestions for Stimulating Interest in Sewing Machines and Other Electrical Devices.**

It will soon be the season for the annual fall sewing. It is a time of worry and confusion for the average housewife, and anything that will lighten her labors at this busy period is sure to receive careful consideration. This, then, is the time to push the electric sewing machine motor and by means of catchy ads, supplemented by window displays that show the advantages of this convenient device, work up a satisfactory business in them.

One of the cleverest of electric sewing machine ads noted recently was that of Eatons, the Big Store, of Toronto, Canada. At the top was the cut of a young woman operating a motor-driven machine and beneath it:

IF THE MAN FROM MARS MET SISTER SUSIE

the chances are he would demand to know why she carried such a monstrous hand bag. And casting about for an answer that would satisfy this most curious individual, it is as likely as not that dear Susie would reply that the ELECTRIC SEWING MACHINE at her sewing society turned out such a quantity of garments per hour that it was necessary to have a receptacle as big as Aunt Samanthy's carpet bag to take home an afternoon's work for the finishing stitches.

Nor would she be wandering far from the truth in making such a statement, for truly it is the achievement of one of these popular portable ELECTRIC SEWING MACHINES which makes it so popular.

The window display that would complement this ad very effectively was arranged by the Philadelphia Electric Co. The window represented a sewing room, floored with a rag rug. In the background was a clothes chest covered with cretonne, and near it a chair over which was thrown a new fall frock. At one end of the room, on a dress form, was a creation in the process of making. Close by was a table on which lay a paper pattern, several partly cut out garments and an electric pressing iron, together with an electric lamp with adjustable shade. Down front center was an electric sewing machine operated by a young woman in smart frock, and at either side of her were other electrically operated machines. Several cards scattered through the window called attention to the advantage of the motor driven sewing machine: "The cost of electric current for operating this machine continuously for an hour is one-half cent," "This electric sewing machine is guaranteed for five years." Such a display would be easy to arrange, borrowing the dresses from any convenient dry-goods store.

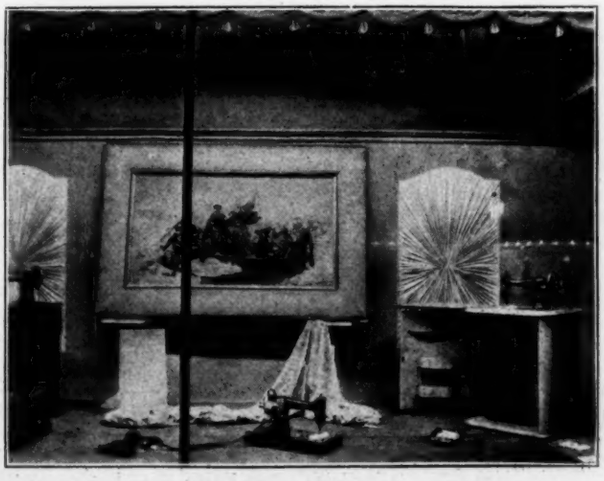
At this season of the year the housewives are thinking not only of fall sewing but fall house cleaning, and a campaign showing the value of electric aids is therefore decidedly timely. Barker Bros., Los Angeles, Cal., conducted a very successful one. In order to arouse interest in the start, they placed a small ad in the paper:

HOW MANY TIMES CAN YOU WRITE OUR NAME ON A CARD?

A series of prizes will be given to the persons writing it the greatest number of times, in a legible manner, without writing over or across other letters. Come in and ask us about it.

This announcement piqued the curiosity and scores came to the store to learn about the offer. Each inquirer was handed a card with the name of the firm printed at the top, the remainder of the space being left free for the contestant to exercise his skill. On the opposite side was printed: "Write the names of three electrical household appliances which you do not possess." The rules of the contest were simple. All writing must be done with ink; all words must be

Clever Sewing Room Display Used to Show the Utility of Electrically Operated Household Devices.



Picture Made on Motor-Driven Sewing Machines Attracts Attention to Display.

legible; all cards must bear the name and address of the writer, together with the names of three electric household conveniences. These addresses were tabulated and the writers circularized with pamphlets describing the advantages of the electric articles mentioned on their cards. The prizes were electric household necessities, which were displayed in the show window.

This contest was followed by a series of concise pointed newspaper advertisements, adorned with cuts of a vacuum cleaner, a sewing machine motor and an electric washing machine operated by young matrons in morning dresses. Their forceful ad follows:

LET MODERN ELECTRIC EQUIPMENTS MAKE MORE SPARE HOURS FOR YOU.

This, of all times and seasons, is ideal for the outfitting of your home with modern household machinerey that will make life easier and happier, save time and strength, conserve food and fuel, facilitate your spring house cleaning and help you to work longer and more zestfully.

COME TO BARKERS.

Let us show you how quickly, easily and pleasantly you can do all your housework with better equipment—electrical, of course.

THESE ARE THE IMPORTANT TIME-SAVING NECESSITIES.

Electric Sewing Machine Motors.
Electric Vacuum Cleaners.
Electric Washing Machines.

The window was fitted up as a sewing room, in which sat a woman busily engaged making a child's dress, using an electric motor to operate the machine. A card suggested, "One can run this sewing machine all afternoon without fatigue, as it requires head power instead of foot power to operate it."

Another excellent display of the use of the motor-driven sewing machine was arranged by the W. C. Munn Co., Houston, Texas. This showed a room with buff background and gilded fixture molding all around the wall. Set in the wall at either side were two panels of shirred silk of steel gray. At one end was a long French window with similar shirred panels. In the center background set on two gilded supports was a huge picture of brocade bound in gold, containing a picturization of "Washington Crossing the Delaware." A card advised, "Picture done entirely in colored silk thread and make on a regular sewing machine." At either side were sewing machines and cabinets and down in front a sewing machine with motor attachment.

Perhaps the most striking of any of the recent displays, however, was that of the Brush Power Co., Galveston, Texas. The two glass sides of the window had painted on them a succession of red interrogation points a foot high. A sign suspended above the heads of spectators inquired, "Which way do you sew?" First was shown an old-fashioned sewing machine run by foot power, with a card, "The Old Way—Pedal, pedal, on the treadle. Tires you out and makes sewing a drudgery. The machine is heavy, takes up valuable room and is always in the way." By its side was shown a portable electric motor sewing machine and case, likewise with a card, "Portable sewing machine, no bigger or bulkier than a typewriter. Easy to operate. Out of the way when you are not using it—unobtrusive when you are." Other catchy cards were scattered through the window and shown inside the store, where a demonstration was given twice daily of the beautiful, easy and rapid work done on this modern sewing machine. The cards stated, "The modern way. With an Electric Sewing Machine you can sew in any room of the house, upstairs or down." "It requires no effort—makes sewing a real pleasure." "Just attach the cord of the motor to your electric light socket and you are ready to work." Attention was called to a speed device by a red cardboard arrow pointing to it on which was printed in black letters, "This is the speed treadle—You work it with your foot—Just press a little harder when you wish to sew faster." Outside the window was a little rack containing folders describing the new machines in detail and a card above the holder gave the invitation to "Take One."

## WHY WINDOW DISPLAYS SHOULD BE COMPLETE.

**The Skeptic Is Always Ready to Grasp Any Opening and Spoil Effect.**

In every crowd of people there is always one loud-mouthed skeptic who is sure to voice his sarcastic opinions, whether they are correct or not, in an endeavor to create a doubt in the minds of the rest of those present. On the other hand the average person who is ready to accept things at their face value until he is convinced otherwise is very slow to voice his opinions or take up sides with the skeptic unless he is absolutely sure of his convictions and has some personal interest at stake.

This condition especially applies to window displays and advertising. Here the skeptic holds forth in all his glory confident that no one will contradict him. The dealer is busy inside the store or the advertiser miles away and the skeptic's arguments stand alone. Moreover the impression created by his insidious remarks are very difficult to overcome unless corrected on the spot.

The influence of such persons was demonstrated recently at a display of gas appliances. The display was both unique and attractive and drew quite a crowd before the window at all times. It was arranged so that the apparatus shown inside the windows could be operated by anyone in the crowd from the outside and the actual operation of the device could be watched. At this particular time the traffic along the street was very light, but still a crowd of about 10 people were in front of the window, all interested in the device being displayed.

Then the skeptic came. He operated the device once, watched the responding action of the apparatus on the inside and then exclaimed in a voice loud enough to be heard by all, "It looks all right, but it would eat you out of house and home to use it. I know, you can't show me," and walked scornfully away. Immediately all but two in the crowd assumed the same expression and left the display.

One of the two that remained turned to the other and said, "That fellow's all wrong. I own one and the service cost is nothing when compared with the convenience afforded, but, I'm not selling them." The other laughed, he was interested but not a prospect. However, it is reasonable to assume that some of the others were prospects who would require some real salesmanship and a great deal of trouble to convince them now that the skeptic was wrong.

Had the window decorator inserted a small card in the window stating the approximate cost of operation there would have been no argument and probably some sales would have been made that were otherwise lost.

# New Appliances

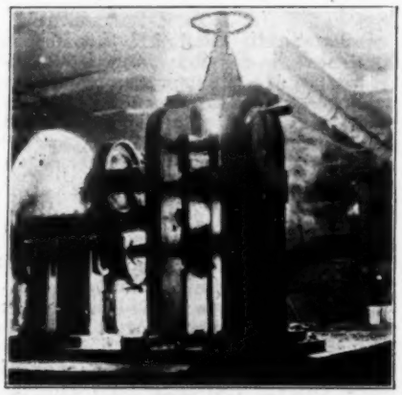
## *Machine for Stripping Scrap Power and Light Cables Increases Salvage Value Greatly — Electric Stucco Machine*

### Cable-Stripping Machine Lowers Labor Cost.

The cable-stripping machine illustrated herewith is used by one of the largest central-station companies in the Middle West in reducing its junk cable to marketable form. Prior to its design and use this work had been done by hand labor which was slow and rapidly becoming too expensive, due to increased labor costs. The necessity for a more efficient method of doing this work resulted in the planning and construction of a machine for the particular purposes of cable stripping.

Large companies have found that the "pull in" and "pull out" method, with respect to their transmission and distribution cables, is best both from an economic as well as an operating standpoint. Naturally a large amount of wire and cable finds its way to the scrap pile, which should be turned into money with very little delay.

The disposition of the lead and copper at the best market values then becomes a matter of consideration. It has long been known that in selling mixed lots of copper and lead, the return is apt to be disappointing unless the exact amount of each is known. This can rarely be stated to the satisfaction of both buyer and seller when the lead, copper and insulation are combined in the cable. At the same time advantage cannot be taken of market conditions which at any particular time might be low for lead but high for



Cable-Stripping Machine.

copper and vice versa. Unless the cable can be separated into its several parts the selling must be done at a loss.

Fortunately this new machine separates the parts into almost the pure form which allows them to be disposed of advantageously. It cuts the lead and insulation from the copper conductor, by means of two circular knives or cutters, the distance between their centers being adjustable. They are set to cut two slits in the cable, on opposite sides of it as it passes between the cutters. These knives are keyed to the shaft, can be taken off, sharpened or renewed whenever necessary. The distance between centers of the knives is adjusted by means of the hand wheel on top of the machine, and it is necessary to adjust this according to size of the cable which is being stripped. On both sides of each cutter separate cylinders are mounted which support short prongs for the purpose of digging into the cable sufficiently to pull it through the machine. Single-conductor cables are disposed of by passing through once only, but with three-conductor cables the first cut takes off only the lead and the outer belt of insulation. Each insulated conductor is then passed through to separate the copper from the insulation. It has been found that lengths of cable not over 10 ft. can be handled easiest, and where necessary it is the work of a few seconds to cut a cable into 10-ft. lengths. The lead and copper can then be stacked up separately ready for sale.

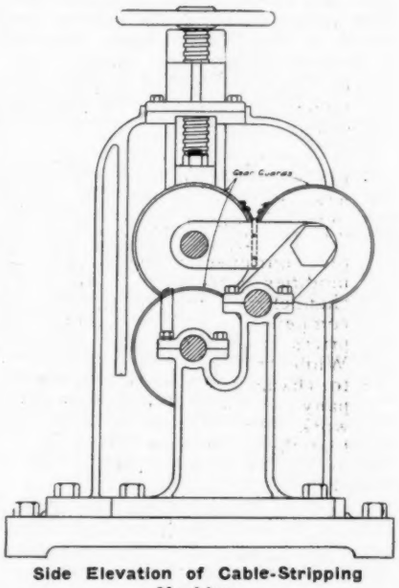
Cambric insulation, or oil-impregnated paper is used in the heating furnace and makes excellent fuel.

No cable smaller than No. 0 is put through the machine, because of the extremely small saving in the case of smaller cables makes it appear doubtful if there is any economy at all in stripping them. They are sold as junk lead.

This apparatus can be located at a central tool room where help is obtainable at odd times and where extra supervision is not necessary. Two, three or four men can work efficiently with this machine. A larger number are apt to interfere with each other and raise the unit cost somewhat. Where four men work at it, two men ordinarily carry up and feed the cable through the machine. One of the other two takes care of the lead and the fourth man carries away and stacks up the copper.

The machine is mounted on a table about 3 by 10 ft. by 30 ins. high. It receives its power from a 2-hp. d.-c. shunt motor mounted on the underside of the table, and belted to the stripping machine. A belt guard absolutely encloses the pulley and the belt so there is no danger of clothing getting caught and accidents happening through negligence. Guards enclose the other gears making the machine very safe even with help unaccustomed to working around machinery. A starting box and safety enclosed switch are included in the outfit and are mounted so as to be immediately at the hand of the man who is feeding the cable into the machine.

For centering different sizes of cable with respect to the knives, two guides were found necessary. They consist of flat plates hinged at the bottom, the distance between them




Side Elevation of Cable-Stripping Machine.

being adjusted by means of a small hand wheel at the side of the machine.

The copper which is used in the manufacture of cable is pure to a high degree and when separated by this process is, with the exception of a small amount of oil adhering to the copper, as pure as the original. It is sold for the same price as scrap copper, which is approximately 85% of the market price for ingot copper. The lead is sold without further treatment at about 75% of market price for pure lead.

### Electric Stucco Machine.

Putting on stucco with an electric machine now makes easy work of what is usually regarded as a difficult and tiresome job. With the help of an assistant who attends to the supply of stucco in the hopper, the operator can cover space rapidly with the Hodges stucco machine. The spider blades revolve at the rate of 1500 r.p.m. The force with which the material is thrown brings to the surface of this material an ooze of moisture or film of water that causes a skin or enamel to form, leaving a surface impervious to moisture.

# Trade Activities

## *Hemingway Glass Combines Offices — Holtzer-Cabot Employes Receive Gift for Ten Years' Service — Literature*

**The Trumbull Electric Manufacturing Co.,** Plainville, Colo., is sending out circular No. 39, containing data on Circle "T" wire connectors for stranded, and solid and stranded cable.

**Chicago Mica Co.,** Valparaiso, Ind., has recently acquired the services of L. T. Frederick as consulting engineer and production manager. Mr. Frederick was formerly process engineer of the Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa., and has had a broad experience in the manufacture and application of all lines of electrical insulation.

**Beardslee Chandelier Manufacturing Co.,** Chicago, is sending out a new trade discount sheet, effective Sept. 15, and applicable on catalogs S-5, No. 20, No. 22 and S-4. Due to the continued advance in all commodities used in the manufacture of chandeliers, the company has been compelled to withdraw all previous prices, discounts and quotations. While the new discounts are subject to change without notice, the company is reasonably sure, with the work being done to reduce costs, that there will be no further advance in prices this year.

**American Steam Conveyor Corp.,** Chicago, in its latest illustrated folder asks its prospective customers the pertinent question, "Have you ever counted the cost of moving ashes from boiler plant to bin or pile?" The folder advances in a very logical way, arguments favoring the use of an American steam ash conveyor in power plants, and shows the savings that can be accomplished through its use. The company has also published a book of 160 pages on "Modern Methods of Ash Disposal," which contains much valuable engineering data and should be of special interest to engineers, superintendents or owners of power plants.

**The Holtzer-Cabot Electric Co.,** Roxbury, Boston, Mass., recently presented a gift of $100 to every man and woman who had been in the employ of the company for ten years or more, and in recognition thereof they presented a testimonial to the president. It contains an expression of thanks of the generous recognition and the good feeling that has always existed between the officials of the company and its employes. The testimonial bore the signatures of all who were recipients of the gift and also recorded the number of years of service of each employe. Heading the list of male employes was the name of J. George Rick with 44 years of service with the company, and Miss Jennie L. Conroy heading the list of ladies with a record of 31 years.

**Engineer Co.,** New York City, is distributing a 15-page book which has for its title "The Development of an Idea." This publication, 8x11 ins. in size, is devoted to a discussion and explanation of Turner baffle walls and shows installations of these baffles. It is well illustrated and includes an efficiency chart showing the savings that may be secured by the improvement of $CO_2$ and of flue gas temperatures.

**Berthold Electrical Manufacturing Co.,** Chicago, has recently issued a new folder on its electric washing machine, and offers a solution to the problem of "Blue Monday," lessening the drudgery of washday which has ever been a source of work and worry to the housewife. Not only is this machine claimed to wash clothes but to launder them like new. The Berthold electric is a compact, motor-driven machine operated on the revolving cylinder plan, made possible by reversing mechanism. This the company claims is a big feature and the result of the continual reversing is that a washing is completed in a time much shorter than that required by many other machines on the market today.

**Buda Co.,** Railway Exchange building, Chicago, manufacturer of "Buda" motor and supplies for mill, mine and railroad, has issued a very interesting booklet entitled "The Buda-Ross Electric Light Plant." The booklet shows in an attractive and instructive form, the one kilowatt and the one-half kilowatt steam turbogenerator electric light plant manufactured by the company for lighting small industrial plants using a steam boiler, small steam boats, dredge boats, steam shovels, well drilling rigs, small mines, small saw mills, cotton gins, and any other industry using a steam boiler where the lighting requirements do not run over one kilowatt. The Buda Co. began the manufacture of small steam turbogenerators for locomotive headlight service about six years ago. It has been adopted by many industries and the demand for this kind of a lighting plant has grown to such an extent that the company has made some recent improvements in it, enlarged the facilities for production, and will market it generally through dealers as one of the main lines of Buda products. This booklet will be furnished upon request to the company.

**Major Equipment Co., Inc.,** Chicago, Ill., is distributing a 16-page booklet which has for its subject "Better Lighting Effects in the Theater" as provided through the application of Major pre-selection system of remote control. This booklet presents a description of the elements of the Major system, which meets the most rigid safety rules of municipal authorities and safety boards, and explains the operating mechanism of this equipment. The system is recognized by theater authorities as one of the highest developments offered for producing lighting effects and giving the service required by present-day theaters. A number of the installations of Major boards and control are described in detail in this publication.

**Hemingway Glass Co.,** manufacturer of glass insulators, which heretofore mantained a factory at Muncie, Ind., and offices at Covington, Ky., has combined the Covington offices with the office located at the factory at Muncie, effective Sept. 8.

**E. B. Badger & Sons Co.,** American Spray Department, Boston, is distributing Badger Service bulletins Nos. 100 and 102. The first deals with the cleaning and cooling of air with sprays as applied to the generator, laying particular stress on the advantages from an operating standpoint of a supply of cool, clean air for generator use. The second publication has for its subject "Cooling Water with Sprays" and describes a spray cooling system which meets the demand for an efficient dependable and inexpensive method of cooling water for condensers, ice plants, cotton and cement mills, or in fact, any industry requiring an abundant supply of cold water. Detailed and illustrated descriptions of this equipment are contained in both publications and views of typical installations are shown.

**Roller-Smith Co.,** 233 Broadway, New York, is distributing new publicity matter describing a number of its products. Bulletin sheet No. 96, revised May 1919, contains a detailed description of the Columbia induction watt-hour meters for alternating current, switchboard type, and switchboard type instrument transformers. Another bulletin (No. 100) has for its subject Roller-Smith electrical instruments for signal system testing, including direct and alternating current portable volt-ammeters and direct reading portable ohmmeters. In this publication is introduced the new "Handy S. S." type of direct-current volt-ammeter. This instrument is small, compact and entirely self-contained, and is recommended for maintenance work where cost and size are paramount. Large numbers of these instruments are in constant service, and they are looked on with increasing favor because of their dependability. They are of rugged construction and will withstand much abuse without losing their accuracy.

# Current News

## *Weekly Record of Construction Activities—Conventions*

### EASTERN STATES.

**New Bedford, Mass.**—In connection with the construction of the proposed hotel building by the New Bedford Hotel Co., to be located at Middle, Pleasant and Foster streets, to cost $1,000,000, considerable electrical equipment will be required. Clinton & Russell, 32 Nashua street, New York, are architects for the company.

**Watertown, Mass.**—Engineer F. D. Smith, Ashburton Place, Mass., has prepared plans for $15,000 improvements for water system. Electric pumping apparatus will be purchased. Metropolitan water and sewerage board, Ashburton place, Boston, owner.

**Hartford, Conn.**—Hartford Electric Light Co. has commissioned Stone & Webster, Boston, to prepare preliminary plans for a generating plant station with a capacity of 100,000 kw. or 125,000 hp. to be located on the Connecticut river in that city. The proposed plant is to be more than three times the size of the present plant at Dutch Point.

**South Norwalk, Conn.**—In connection with the new plant to be erected by Crofut & Knapp, South Norwalk, on Van Zandt street, East Norwalk, plans have been prepared for the construction of a power plant, 60x150 ft. for factory operation. Ground has recently been broken for the initial work on the main manufacturing building, which will be a five-story structure, about 60x300 ft. It is understood that upon completion of the work the company will concentrate operations at the new plant.

**Binghamton, N. Y.**—Work has recently been completed and operation inaugurated on the new electric street-lighting system extending from Court to Lewis street on State street. Lighting units of 250 cp. are utilized.

**Binghamton, N. Y.**—Bids have been taken by the State Hospital Commission, Albany, E. S. Elwood, secretary, for the construction of the proposed power plant at the Binghamton State Hospital.

**Binghamton, N. Y.**—Paul A. Hilbert Co., Newark, N. J., operating an electrical contracting establishment, has completed plans for the opening of a new local branch.

**Central Islip, N. Y.**—State Hospital Commission has awarded a building contract to Benjamin Rayner, Locust Avenue, Islip, L. I., for the construction of the proposed power house at the State Hospital, Central Islip. The structure will be about 80x120 ft., and is estimated to cost, with equipment, about $150,000. Lewis F. Pilcher, Capital building, Albany, is state architect.

**Lockport, N. Y.**—Lockport Light, Heat & Power Co., 111 Main street, has filed application with the Public Service Commission for permission to revise its rates for electric lighting and power service.

**New York, N. Y.**—In connection with the proposed four-story and basement plant, 90x200 ft., of the Mint Products Corp., 949 Broadway, to be erected at Port Chester, N. Y., at a cost of about $350,000, considerable electrical and mechanical equipment will be required.

**New York, N. Y.**—Victory Battery Co., Inc., 30 West Houston street, has filed notice with the Secretary of State of an increase in its capital from $20,000 to $30,000, for business expansion.

**New York, N. Y.**—Board of Managers of the Fordham Hospital, South boulevard, have had plans prepared for the construction of a new one-story brick power plant, about 46x86 ft., at the institution, estimated to cost $5000.

**New York, N. Y.**—Wilson Maulen Co., 781 East 142nd street, manufacturer of pyrometers and kindred specialties, has had plans prepared for the construction of a new three-story brick plant, about 50x100 ft., for increased operations.

**Poughkeepsie, N. Y.**—Smith Bros., North Hamilton street, are taking bids for the erection of the proposed plant at Michigan City, Ind., estimated to cost $250,000. The works will comprise main manufacturing building, supplemented by a power plant for factory operation. William P. Field, 763 Broad street, Newark, N. J., is architect for the company.

**Utica, N. Y.**—Board of Managers of the Utica State Hospital, State Hospital Commission, E. S. Elwood, secretary, is having plans prepared for the construction of a new power plant at the institution. Lewis F. Pilcher, Capitol building, Albany, is state architect.

**White Plains, N. Y.**—American Traction Ring Co. has filed notice with the Secretary of State of an increase in its capital from $10,000 to $150,000.

**Bloomfield, N. J.**—Sprague Electric Works of the General Electric Co. has recently inaugurated work on the construction of a new addition to its plant on Lawrence street. The structure is estimated to cost about $15,500. Salmond Brothers, Elm street, Arlington, have the erection contract.

**Butler, N. J.**—Borough Council is planning for the installation of a new electric lighting system along Carmonton road, Bloomingdale. Plans for the proposed work are now being prepared.

**Irvington, N. J.**—Yocum Chemical Co., 325 Academy street, Newark, has awarded a contract for the construction of a new one-story factory and boiler plant, about 40x117 ft., to be located at 168-78 Coit street, Irvington.

**Kearny, N. J.**—Contract has been awarded by the Ford Motor Co., Detroit, Mich., to the Lord Electric Co., 105 West 40th street, New York, for electrical work in connection with the construction of its large new local assembly plant.

**Newark, N. J.**—J. Brochie & Co., Inc., 8 Railroad place, is having plans prepared for alterations and improvements in its boiler plant and works at Llewellyn avenue and Fulton street, Bloomfield, to cost about $30,000.

**Trenton, N. J.**—Harry E. Stahl, Trenton, has submitted a low bid to the city commissioners for the installation of electric, steam and hydraulic apparatus in the municipal pumping station of the city waterworks on Calhoun street, at $108,941.

**Wanaque, N. J.**—Active plans are in process of formation by the Borough Council for the installation of the proposed electric street-lighting system throughout the borough. Contract for furnishing service for operation was recently awarded to the Tri-County Electric Co., Pompton Lakes.

**Allentown, Pa.**—In connection with the plans and specification now in course of preparation by the City Council for the installation of a new sewage disposal plants, pumping stations, etc., considerable new electrical and mechanical equipment will be required.

**Allentown, Pa.**—Lehigh Navigation Electric Co. has filed with the Public Service Commission a new schedule of rates for service, effective Oct. 1, 1919. The new tariff eliminates from the schedules for wholesale power at 110,000 volts, and for service to public service electric light and power companies, the "coal clause" making corresponding changes in energy rates.

**Catasauqua, Pa.**—A street lighting system will be established. Address Daniel Gillispie, Borough Secretary.

**Gettysburg, Pa.**—At the November election the question of issuing $50,000 municipal light bonds will be submitted to vote.

**Harrisburg, Pa.**—Western Union Telegraph Co. has filed application with the Public Service Commission for permission to remove the overhead wires in the central and eastern parts of the city by way of Cameron and Paxton streets, and the installation of underground conduit system to replace the present facilities.

**Kittanning, Pa.**—Public Service Commission has denied the application of the Borough Council for permission to construct a municipal water plant. It is held that the building of a new plant would be a duplication of the facilities of the Armstrong Water Co., and would necessitate the expenditure of about $300,000, which would exceed the limit of indebtedness allowed the municipality.

**Morrisville, Pa.**—Mechanical and electrical machinery will be installed in the new sewerage disposal plant to be constructed by the Borough Council, at an estimated cost of about $200,000. Thomas F. Bovie, engineer, will prepare plans and specifications.

**Morrisville, Pa.**—Plans are under consideration by the Borough Council for the issuance of bonds for $40,000 for the installation of a new municipal water supply and distributing system. The State Board of Health is interested in the proposed work.

**Philadelphia, Pa.**—Rockland Hosiery Co., Kensington avenue, is taking bids for the erection of a new boiler plant and factory building, for increased operations. It is understood that an administration building will also be constructed, the entire work being estimated to cost $100,000.

**Philadelphia, Pa.**—Wirt Co., Arma and Lena streets, manufacturer of electrical specialties, has prepared plans for a new plant, two stories, 62x158 ft., to cost $60,000. Charles Wirt is president.

**Philadelphia, Pa.**—Department of Public Works has received bids for the furnishing and installation of four new turbo-centrifugal pumping units at the Queen Lane pumping station of the city, to have a capacity of 40,000,000 gals. each every twenty-four hours. The new units will replace the present equipment comprising one pump, 25,000,000-gal. per day capacity and four pumps of 20,000,000 gal. each installed some few years ago. It is also proposed to make other extensions and improvements in the municipal water system.

**Reading, Pa.**—It is interesting to note that the Metropolitan Edison Co. has received contracts for the wiring of 145 old residences for electric service during the month of August.

**York Haven, Pa.**—York Haven Water & Power Co. has been granted permission by the Public Service Commission to construct a new electric transmission line from Middletown to Annville.

**Wilmington, Del.**—Sun Telephone & Telegraph Co. of Mississippi, a Delaware incorporation, has filed notice with the Secretary of State of an increase in its capital from $50,000 to $150,000, to provide for general business expansion.

**Wilmington, Del.**—Delaware Marine & Motor Co. has had plans prepared for the construction of a new machine shop at the foot of Commerce street, for increased operations.

**Wyoming, Del.**—Wyoming and Camden have voted unanimously for a $10,000 bond issue for the purchase jointly of the water works and electric light plant.

## DATES AHEAD.

Iowa State Association of Electrical Contractors and Dealers. Annual convention, Sioux City, Iowa, Sept. 22 and 23. Secretary, F. Bernick, Jr., Oskaloosa, Iowa.

New England Section, N. E. L. A. Annual convention, New London, Conn., Sept. 22-24. Headquarters, Hotel Griswold. Secretary, Miss O. A. Bursiel, Boston, Mass.

Association of Iron and Steel Electrical Engineers. Annual convention, St. Louis, Mo., Sept. 22-26. Secretary, John F. Kelly, Empire building, Pittsburgh, Pa.

American Electrochemical Society. Fall meeting, Chicago, Sept. 23-26. Headquarters, Congress Hotel. Secretary, Prof. Joseph W. Richards, Lehigh University, Bethlehem, Pa.

International Association of Municipal Electricians. Annual convention, Chicago, Sept. 23-26. Secretary, Clarence R. George, Houston, Tex.

Northwest Electric Light and Power Association. Annual convention, Seattle, Wash., Sept. 24-27. Secretary-treasurer, George L. Myers, Portland, Ore.

Empire State Gas and Electric Association. Annual meeting, Buffalo, N. Y., Oct. 24. Secretary, Charles H. B. Chapin, 29 West 39th street, New York City.

National Association of Electrical Inspectors. Annual meeting, Springfield, Mass., Oct. 13 and 14. Secretary, W. L. Smith, Concord, Mass.

Illuminating Engineering Society. Annual convention, Chicago, Ill., Oct. 20-23. General secretary, Clarence L. Law, 29 West 39th street, New York City.

Illinois State Electric Association. Annual convention, Chicago, Oct. 22 and 23. Secretary-treasurer, R. V. Prather, Springfield, Ill.

American Society of Mechanical Engineers. Annual meeting, New York City, Dec. 2-5. Secretary, Calvin W. Rice, 29 West 39th street, New York City.

**Baltimore, Md.**—Baltimore County Electric Co. plans the immediate construction of a new one-story pumping plant at Towson, Md., to cost about $15,000.

**Baltimore, Md.**—Maryland Casualty Co., Baltimore street and Guilford avenue, is having plans prepared for the construction of a new electric power plant to be used for operation of its printing works.

**Baltimore, Md.**—In connection with the proposed plant of the Eastern Rolling Mill Co., estimated to cost in excess of $5,000,000, all equipment throughout will be electrically operated, power to be supplied by the Consolidated Electric Light, Gas & Power Co. The company has awarded a contract for the main manufacturing building of the initial unit, to be about 360x1000 ft., estimated to cost $500,000. It is proposed to have an annual capacity of about 60,000 tons of steel sheets, to be used mainly for the production of automobile bodies, as well as for manufacturing stoves, etc.

**Baltimore, Md.**—Baltimore Gas & Electric Co. is operating its various electric plants at capacity. The company is making extensive improvements and additions at its generating station at Westport to increase the present capacity from 80,000 to 160,000 hp.

**Chesapeake City, Md.**—United States Government is considering plans for the construction of an additional pumping plant for the Chesapeake & Delaware Canal, to provide sufficient water for the dredges operating in the canal and for the additional locks. At the present time one pumping station is already in operation at the site, but it is proposed to utilize two hydraulic dredges which will require a larger quantity of water than now supplied. The new plant will be designed to have a capacity of 50,000,000 gal. of water daily, and will be electrically operated.

**Union Bridge, Md.**—Union Bridge Electric Manufacturing Co. is understood to be considering plans for the extension of its transmission lines to New Windsor, Taneytown, Legore, Key Mar, Middleburg, and New Midway, to provide for increased operations.

**Richmond, Va.**—Tower-Binford Electric & Manufacturing Co., Fourth and Cary streets, is planning for the erection of a new one-story building, 90x116 ft., for the manufacture of electrical fixtures, to cost about $35,000.

**New Cumberland, W. Va.**—West Virginia-Pittsburgh Coal Co. is considering plans for the construction of a new electric power plant at its local properties. In connection with other improvements to be made at the works, the total cost is estimated at approximately $100,000.

**Greensboro, N. C.**—North Carolina Public Service Co. is considering plans for the installation of new ornamental street-lighting standards. The removal of the present overhead wires is included in the plans.

**Murphy, N. C.**—City has approved a bond issue for $100,000 to cover the cost of the installation of a new electric lighting system.

**Laurens, S. C.**—An election will be held to vote on the question of issuing $25,000 water, light, and school building. Address mayor.

**Sumter, S. C.**—City has recently completed negotiations for the purchase of a number of buildings to be used as a site for the electric light and ice plants for municipal service. It is proposed to make extensive improvements followed by the installation of turbine, condenser, stoker, boiler and spray cooling equipment, as well as boiler feed pumps and auxiliary apparatus, the entire work being estimated to cost about $90,000.

**Varnville, S. C.**—F. L. Moxon, Varnville, is said to be considering plans for the construction of a new local electric light plant.

**Daytona Beach, Fla.**—Nelson Mounts has received an electric light and power franchise.

## NORTH CENTRAL STATES.

**Minerva, Ohio**—Architect Froelich-Emery, 412 Second National Bank building, Toledo, has prepared plans for $50,000 power plant to be erected by village of Minerva. The building will be 40x120 ft. in dimensions, brick and concrete construction, steam heating, brick interior finish, electric

lighting. Address R. A. Penneth Mayn, Minerva.

**Anderson, Ind.**—Union Traction Co. of Indiana has arranged for improvements totaling $100,000 at the Anderson central power station. New boilers are being placed in service and the turbine electric elevators are being overhauled.

**Brazil, Ind.**—Prox & Burgett, Terre Haute, Ind., have the contract for the lighting and heating systems for the new high school building at Bridgeton, Ind. Urban & Apple, Brazil, Ind., have the contract for the general construction of the building for $38,000.

**Indianapolis, Ind.**—J. D. Hunt Manufacturing Co. has increased its capital from $7000 to $15,000.

**Indianapolis, Ind.**—State purchasing committee has awarded to the Indianapolis Electrical Supply Co. a contract for providing the state institutions with electrical apparatus for the coming year. The contract is drawn up on a cost plus 11% basis. The state purchases about $11,000 of electrical supplies annually.

**Logansport, Ind.** — Logansport Utilities Co. has been formed for the purpose of taking over the Logansport Heat & Power Co., which is now in the hands of a receiver. This company will provide heat for many of the business houses, electric light for commercial and residential use and power to industries.

**Chicago, Ill.**—Architect Charles W. Kallal, 1012 City Hall, has prepared plans for $300,000 electric plant to be erected by the city. The building will be 80x86 ft. in dimension, steam heating, plumbing, fireproof roofing, fireproof interior finish, engine and transformer, electrical equipment. Address R. F. Francis, 401 City Hall.

**De Kalb, Ill.**—The contract for the installation of a boulevard system of lighting in the Horsech addition, which includes that part of the city from Locust and Linden around College was let to Philip Swanson for the sum of $5444.30, the cost to be covered by special assessment.

**Galena, Ill.**—A new 33,000-volt transmission line will be built to connect the lines of the Interstate Light & Power Co. at Shullsburg with the lines of the Lena Electric Light & Power Co. near Apple River, a distance of about 10 miles. Under a ten-year contract electric energy will be furnished the Lena company for distribution in Apple River, Warren, Nora, Lena, Pearl City, Shannon and Lanark, Ill.

**Hillsboro, Ill.**—Engineers have been engaged at the Hillsboro plant of the Southern Illinois Light & Power Co. with plans for the installation of additional machinery to double the capacity of the plant.

**Marseilles, Ill.**—Latimer & Hoenshall have opened a new electrical merchandise store in this city.

**Port Byron, Ill.**—Coe Light & Power Co. has petitioned for authority to issue $6000 of capital stock and to construct a telephone line. Address S. L. Woodford, Port Byron.

**Rock Island, Ill.**—City will install 11 additional street lamps at a rate of $21 a year each. The new lamps are to be tungsten in variety and will be installed as a result of a contract made a few months ago with the Peoples Power Co. for arc street light service for $55 instead of $60 each year as was paid under the old contract.

**Rock Island, Ill.**—Rock Island Brake Shoe & Foundry Co., with capital of $100,000, has been organized by M. I. Morris, Hyman Lewis and Simon Lewis.

**Taylorville, Ill.**—The council is considering the matter of establishing a municipal light plant, unless the Central Illinois Public Service Co. does something that is in some degree satisfactory to the committee of the city council and the citizens heat committee. Further definite steps will be taken. Address Mayor Downee.

**Urbana, Ill.**—The contract for the ornamental lighting system in the southwest part of the city, adjacent to the campus of the University of Illinois, has been awarded to Freeman Sweet Co., of Chicago, at a bid in excess of $26,000.

**Woodstock, Ill.**—The Woodstock municipal lighting plant for the year 1918 showed profits of $11,774.69 at a selling figure of 6.429 ct. per kw-hr. The plant in 1917 showed a profit of $13,767.30 at a selling rate of 5.914 ct. per kw-hr.

**Flint, Mich.**—Lot owners on the new Flint Country Club voted to proceed immediately with the installation of water, sanitary sewers, storm sewers, gas, electricity, and telephones, the work to be done under the supervision of the city engineer and the public utilities company at an estimated cost of $226,000. The estimated cost of the various improvements are, gas, $25,000, electricity, $50,000, telephones, $30,000.

**Adams, Minn.**—The city will vote at special election for electric light plant. B. H. Carr, village clerk.

**Alden, Minn.**—At a special election held recently $8000 were voted and carried for electric light and power for village of Emmons. Contracts made with Minnesota Gas & Electric Co.

**Jackson, Minn.**—Jackson Light & Traction Co. will improve its railway and electric light plant. Address L. O. Gordon, general manager.

**Minneapolis, Minn.**—The new 33,000-hp. steam turbine which the engineering department of H. M. Byllesby & Co. has been installing in the Riverside Station of the Minneapolis General Electric Co. has been completed and turned over to the operating department. This generating unit brings the capacity of the Riverside Station up to 70,000 hp., or more than four times as great as in 1911. The business of the company has grown so rapidly that the peak load at the present time often exceeds the greatest peak in the company's history which occurred last December.

**St. Paul, Minn.**—It is reported that a $150,000 paint factory will be constructed by the Mutual Paint Co. on land recently purchased. The capacity of the plant will be about 5000 gals. daily.

**La Crosse, Wis.**—Western Wisconsin Telephone Co. will install copper metallic circuit from Centerville, Minn. to Winona, Minn., and contemplates extending lines to Trempealeau Valley and Beaver Creek Valley. Address L. H. Dodge, manager, 127 North Fourth street.

**Racine, Wis.**—Racine Auto Tire Co. will build a power house to generate current for its factory. Address Menzel & Becker, Baker building.

**Grinnell, Iowa**—Iowa Light, Heat & Power Co. will extend its electric transmission lines to points in O'Brien county.

**Ottumwa, Iowa**—Agency, Iowa, has been added to the lines of the Ottumwa Railway & Light Co. The service was inaugurated on Aug. 28.

**St. Charles, Iowa**—Gibson Electric Co., Des Moines, will make improvements to its power plant. Three fuel-oil engines, three 10 hp. to 50 hp. generators, from 8 kw. to 35 kw. and four switchboard panels complete. Overhead material for 10 to 20 miles of overhead line. G. F. Gibson, Box 408, Des Moines, in charge.

**Independence, Mo.**—A special election was held recently to vote on the question of issuing $65,000 electric light bonds. Address city clerk.

**Maryville, Mo.**—The city will install two 600-gal. per min. motor-driven centrifugal pumps, one 700-gal. per min. low service pump and other equipment. E. E. Harper, Kansas City, Mo., engineer; A. D. Hewitt, clerk.

**St. Louis, Mo.**—United Railway Co. will ask bids for building and repairing 21 miles of line. R. Wells is receiver.

**Auburn, Neb.**—City will hold an election for a bond issue to enlarge municipal light plant. Address Mayor Dovel.

**Lincoln, Neb.**—The State Railway Commission has asked the Omaha & Council Bluffs Street Railway Co. to extend its lines eight blocks in South Omaha.

**Omaha, Neb.**—Omaha Flour Mills Co. will erect seven story concrete grain elevator to cost $600,000. The new elevator will put out 2500 bbls. of flour daily and has space capacity of 300,000 bu.

**Gregory, S. D.**—At a special election $122,000 bonds were voted and carried for electric light plant and sewerage system.

**Mitchell, S. D.**—City contemplates traffic lights at Main street. J. E. Wells, mayor.

**Anamoose, N. D.**—Anamoose Electric Light Co. burned. Loss, $25,000.

## SOUTH CENTRAL STATES.

**Carrollton, Ky.**—City is considering plans for the issuance of bonds for $25,000 to provide for new municipal electric light and water systems. J. E. Gullion is mayor.

**Newport, Ky.**—City Commissioners are planning for the construction of a new local electric light plant to

furnish electric energy for municipal service, as well as to Bellevue, Dayton, Ft. Thomas, Highlands District, Clifton and Southgate.

**Dawson Springs, Ky.**—United States Government has awarded a contract to the Brandenburg Construction Co., Chicago, Ill., for the installation of a new electric plant at the local Government hospital site.

**Louisville, Ky.**—During the week ended Aug. 29 the commercial department of the Louisville Gas & Electric Co. received contracts for 59 electric customers with 33 kw. of lighting and 216 hp. in motors and took orders for wiring 13 already built houses. Connected load gain (net) for the week included 43 customers with 23 kw. of lighting and 17 hp. in motors. Electric energy output for the week was 10.2% greater than for the same week of 1918.

**DeRidder, La.**—City has approved the issuance of bonds for $100,000 for the installation of new municipal electric light and water systems. C. C. Davis is mayor.

**Natchez, Miss.**—National Box Co. will install electric power and make improvements at its plant.

**Yazoo City, Miss.**—City Council is having plans prepared for the installation of a new double-unit electrical system for municipal service, estimated to cost $20,000.

**Greenfield, Tenn.**—A special election will be held to vote on the question of issuing $700,000 in bonds for water system and power house. Greenfield is supplied electric current and water by a private corporation.

**Rutherford, Tenn.**—Sept. 22 an election will be held to vote on the question of issuing $15,000 municipal light plant bonds. Address village clerk.

**Afton, Okla.**—$10,000 will be expended improving light plant. Address mayor.

**Miami, Okla.**—Additional light and water bonds have been authorized. Equipment will be purchased. Address mayor.

**Minco, Okla.**—City Council is considering plans for the issuance of bonds for $11,000 to provide for the installation of a municipal light and water plant.

**Ponca City, Okla.**—Plans are under consideration by the city for extensions in the municipal electric light plant. It is understood that bonds for $25,000 will be voted on to cover the cost of the proposed work. W. H. McFadden is mayor.

**Sapulpa, Okla.**—Sapulpa Electric Co. is supplying electric energy amounting to 100 hp. in motors to the Bartlett Collins glass plant which has just been opened for the season. This is double its former requirements.

**Bryan, Tex.**—City has voted a bond issue for $75,000 to provide for the purchase of the local electric light plant. It is proposed to make extensive improvements and alterations in the plant to increase the present capacity.

**Houston, Tex.**—Houston Lighting & Power Co. has awarded a contract to Horton & Horton, Houston, for the construction of a large new extension to its boiler plant, at estimated cost of $75,000.

**Dallas, Tex.**—The city secretary has been instructed to advertise for bids for incandescent lights for the city.

**San Angelo, Tex.**—The city commissioner has authorized the erection of an electric light, power and water plant for which $500,000 has been appropriated. Address mayor.

**Wichita Falls, Tex.**—Wichita Falls Electric Co. is having plans prepared for the construction of a new electric transmission line to the Burkburnett field.

## WESTERN STATES.

**Colorado Springs, Colo.**—A large hotel capable of accommodating several hundred guests, a pavilion, costing approximately $25,000, electrical power, plant and lighting of the roadway and park, opening the park for cabin sites, and improvements to the auto road leading to the park, are planned for Crystal Park. W. C. Dotterer, president, Crystal Park Mountain Auto Road Co.

**Pueblo, Colo.**—During the week ended Aug. 29 the Arkansas Valley Railway, Light & Power Co. added 72 electric customers to its lines with 52 kw. of lighting and 911 hp. in motors; also 87 household electrical devices including 56 electric flat irons.

**Millville, Utah.**—The Town Council has perfected plans for the installation of a municipal electric light and power distributing system, covering all principal sections of the municipality. It is proposed to secure power at wholesale rates from the Utah Power & Light Co.

**Hardin, Mont.**—Mountain States Telephone & Telegraph Co. will construct telephone line from Billings to Hardin. Work will start soon.

**Libby, Mont.**—In connection with the construction of a proposed 200 concentrating works, the Lukens-Hazel Mining Co. is planning for the construction of an electric power plant for works operation. The proposed structure will be located in the vicinity of the local properties, with pipe line extending from Granite Creek for operation. The entire project is estimated to cost about $200,000.

**Florence, Ore.**—The electric plant burned. G. G. Bushman, Eugene, Ore., is owner.

**Hoquiam, Wash.**—Plans have been completed by the local Commercial Club for the installation of a new street-lighting system on Eighth and Ninth streets.

**Seattle, Wash.**—The City Council has approved an appropriation of $1,520,335 for the purchase of new equipment and supplies for the municipal lighting department.

**Seattle, Wash.**—Pacific Coast Coal Co. is planning for the construction of a new high-tension transmission line from a point near Renton, following along the Renton-Newcastle County Road. A permit for the work has been granted by the County Commissioners.

**Seattle, Wash.**—The City Council has authorized the preparation of plans and specifications for the construction of a new electric generating plant on Lake Union, adjoining the present power station of the city at this point. The plant will be of reinforced concrete, 80x120 ft., and with generating equipment and auxiliary operating machinery is estimated to cost $1,250,000. J. D. Ross is superintendent of lighting. Daniel Huntington, city architect, will be in charge of the work.

**Avalon, Cal.**—The Common Council is planning for the early construction of its proposed municipal electric light and power plant, and waterworks system, bonds aggregating $88,000 having recently been voted.

**Fresno, Cal.**—San Joaquin Light & Power Corp. has commenced the erection of its proposed new hydroelectric power plant at Auberry, Fresno county. The station is estimated to cost more than $1,200,000. The installation will comprise turbines, generators and other prime moving apparatus; transformers and other electrical equipment. A. D. Wishon is manager.

**Marysville, Cal.**—Marysville & Nevada Power & Water Co., with headquarters at Marysville, is planning for the construction of a new hydroelectric power plant at Bullard's Bar, with transmission and distributing system to furnish service to Marysville, Sacramento and other points in this district. The territory is now served by the Pacific Gas & Electric Co. and the Great Western Power Co.

**Healdsburg, Cal.**—The Common Council is planning for a bond issue of about $20,000 for improvements and extensions in the local lighting system.

**Riverside, Cal.**—Southern Sierras Power Co. has completed work on the "stepping up" of its high-tension transmission line from Bishop to San Bernardino, a distance of about 240 miles. The work has been under way for the past twelve months and represents a cost of about $250,000. A voltage of 2200 volts is maintained at the power plant and this is now increased to 87,000 volts for long-distance transmission. The change increases the horsepower from 25,000 to 60,000, or about 2¼ times.

**San Francisco, Cal.**—Great Western Power Co. is rushing construction work on its new Caribou electric generating plant, near Oroville, to insure the completion and operation of the plant in 1920. The company expects to inaugurate service at the station about six months in advance of the time initially anticipated. E. W. Beardsley is superintendent.

**Stockton, Cal.**—Western States Gas & Electric Co. is arranging to furnish increased power service to the National Paper Products Co. The company's present load aggregates about 1100 hp., and new motors and other electrically operated equipment will be installed.

**Visalia, Cal.**—The Commercial Club in co-operation with the local

Board of Trade is planning for the installation of a new ornamental street lighting system in the business section, to form a uniform system of electroliers. New lamps will be investigated for the proposed installation. J. D. Allen is secretary of the Board of Trade.

## FOREIGN TRADE

*[Addresses of firms referred to in these trade opportunities may be obtained by writing to the Bureau of Foreign and Domestic Commerce, Washington, D. C., or its branch and local co-operative offices. Request for each opportunity should be on a separate sheet and the file number given.]*

**Electrical Supplies (30,5663).**—The electrical engineering department of a municipality in South Africa requires different kinds of electrical supplies, such as twin conductor lead-covered cable, triple concentric cable, boiler tubes, centrifugal pump and motor, recording ammeters, single-phase transformers, sundry supplies, etc. Inquiry forms and blue prints were forwarded and may be examined at the bureau of its district offices. (Refer to file No. 123150). Tenders should be forwarded by mail at the earliest possible moment, so that it may arrive by Oct. 1, 1919, if possible.

**Electrical Articles. (30,567).**—An agency is desired by a man in Italy for the sale of cameras and photographic supplies, cinema supplies, electrical articles and accessories, and general technical articles. Correspondence should be in Italian or French. References.

**Friction Winches. (30,599).**—Cable quotations f. o. b. New York are desired by a man in Australia on two steam hammers of 3000-lb. blow for driving wooden piles and two electric pile-driving friction winches for the same purpose.

**Transmission Machinery. (30,609).**—The development of new coal mines is planned by the government of a country in the Far East, and the chief engineer desires to receive catalogs of electrical transmission machinery, mining machinery, machine tools, etc. A complete list of what will be required may be obtained on application to the Bureau or its district offices.

**Wireless Telegraphy Outfits. (30,614).**—A commercial agent from Chile is in the United States and desires to secure agencies for the sale of artificial leather, wireless telegraphy outfits and supplies, and building and construction materials and supplies. Reference.

## PROPOSALS

**Wire, Generators, Etc.**—Bids will be received at Flagler, Colo., on Sept. 29 for the construction of a municipal water system. The specifications include one carload of poles, 5000 lbs. No. 8 braided weatherproof wire, one 35-hp. oil engine, one 75-hp. oil engine, and suitable generators for above engines, one switchboard, etc. These are to be in accordance with plans and specifications prepared by Royal S. Salisbury, consulting engineer, 1415 East Colfax street, Denver, Colo. Address William Knies, clerk and recorder.

**Power Plant.**—Bids will be received at New Castle, Ind., Sept. 23 for a laundry and power house at the Indianapolis Building for Epileptics. Specifications include two 75-kw. generator. Address Dr. W. C. Van Nuys. Contracts wlil be let by Herbert Foltz, Indianapolis, architect.

## NEW PUBLICATIONS

**War Minerals, Nitrogen Fixation and Sodium Cyanide** is the title of Bulletin 178-B by Van H. Manning, consisting of an advance chapter from Bulletin 178 War Work of the Bureau of Mines. The term war materials has been applied to those ores and minerals that were largely imported before the war, included in which are chromite for tool steel, for tanning leather, and as a refractory lining in furnaces; magnesite, for refractory linings; mica, as insulating material; platinum, for the manufacture of sulphuric acid and for electrical apparatus. When the United States entered the war it was clear that every ship would be needed and that the number available for importing minerals would be small, and hence a quick and thorough survey of domestic resources was necessary. In this publication are presented the results of the investigation conducted by the Bureau. The price of the paper is 5 cts. a copy and may be obtained by addressing a request to the Superintendent of Documents, Government Printing Office, Washington, D. C.

## INCORPORATIONS

**Logansport, Ind.**—Logansport Utilities Co. has been incorporated with capital of $60,000 to supply light, heat and power by O. H. Binns, Frank B. Wilkinson, William R. Casparis and William O. Taylor.

**Kyle, Tex.**—Kyle Light & Power Co. has incorporated with a capital of $7000. Incorporators: C. F. Maindrich, J. D. Winder and others.

**New York, N. Y.**—S. G. V. Electrical Co. Capital, $10,000. To manufacture electrical supplies, etc. Incorporators: J. and M. Knapp, and J. Goldfarb, Jr., 136 Broadway.

**New York, N. Y.**—Eureka Lighting Supply Co. Capital, $8000. To manufacture electric and gas fixtures, etc. Incorporators: I. J. Shirmel, S. Geller, and H. M. Feuerstein, 11 Graham avenue, Brooklyn.

**New York, N. Y.**—United Electric Stores, Inc. Capital, $50,000. To deal in electrical goods, etc. Incorporators: P. McGeavy, K. R. Schuslstrom, and J. W. Flint, 947 Sixth avenue.

**Syracuse, N. Y.**—Doman Development Corp. Capital, $100,000. To engage in a general electrical engineering capacity. Incorporators: A. E. Doman, W. H. Fleisch, and L. Will.

**East Orange, N. J.**—Wizard Light Co. Capital, $500,000. To engage in a general electrical and mechanical engineering capacity. Incorporators: Albert K. Porter, William H. Wagner, and Arthur A. Fisher.

**Newark, N. J.**—American Consolidated Electric Co. Capital, $100,000. To manufacture incandescent electric lamps. Incorporators: Frederick A. Schiller, John H. McCaulley and Davis Lesnik.

**Washington, D. C.**—Randall X-Ray Co. Capital, $100,000. To manufacture X-Ray equipment, etc. Incorporators: George T. Parker, William A. Randall, and Willis W. Parker, Washington.

**Wilmington, Del.**—Mohr Co. Capital, $55,000. To manufacture lighting, heating and power machinery. Incorporators: S. E. Dill, T. L. Croteau, and H. E. Knox, Wilmington.

**New York, N. Y.**—American Refrigeration & Insulation Co. Capital, $55,000. To manufacture refrigeration machinery and insulation equipment. Incorporators: R. H. Brenner, N. Dacimto, New York; and A. G. Concolte, Brooklyn.

**Topeka, Kans.**—The Pierson Co. Incorporated under Delaware law with a capital of $5,000,000. To manufacture telegraph transmitters and telegraph apparatus. Incorporators: Edwin H. Pierson, Topeka; C. H. Gaunt, Chicago, Ill.; and Paul P. Sweet, New York.

**Indianapolis, Ind.**—Federal Steel Products Co. has been incorporated with capital of $100,000 to manufacture steel articles by William A. Epperson, Joseph B. Wilkins and John Glava.

**Indianapolis, Ind.**—The F. & W. Manufacturing Co. has been incorporated with capital of $30,000 to manufacture mechanical devices by George F. Frisz, James D. Wiltshire and L. R. Zapf.

**Norfolk, Va.**—Hester Electric Co. Capital, $50,000. To manufacture electric fixtures, etc. Incorporators: H. H. Hester and J. G. Good.

**New York, N. Y.**—Matthews Lighting Co. of New York, Inc. Capital, $150,000. To operate a local light and power plant. Incorporators: J. Speer, and W. N. and C. F. Fabell, 706 Riverside Drive.

**Buffalo, N. Y.**—Carter-Hager Electric Corp. Capital, $10,000. To engage in a general electric construction and contracting capacity. Incorporators: L. E. Carter, Henry J. Hager, and John J. Askey, Buffalo.

**Wilmington, Del.**—Phix Light Co., Inc. Capital, $100,000. To manufacture electrical and power machinery, engines, etc. Incorporators: H. E. Knox, T. L. Croteau, and S. E. Dill.

**Paterson, N. J.**—Silk City Lighting Co. Capital, $15,000. To engage in the manufacture of electrical fixtures, etc. Incorporators: John Cooke, B. Clark, and Fred Braun, Paterson.

# Personal

## John Kelly New Sales Manager of Edison Storage Battery —W. D. A. Peaslee Joins Jeffery-Dewitt Insulator—Changes

O. A. JENNINGS has become connected with the Oklahoma Gas & Electric Co., in charge of the electrification of oil well pumping, with headquarters at Oklahoma City.

V. ST. C. MONTIETH, Martinsburg, W. Va., for the past two years superintendent of the local plant of the Potomac Light & Power Co., has been appointed general superintendent of the entire system of the company.

JOHN F. EAGAN, formerly superintendent of the eastern division of the subway and elevated lines of the Brooklyn Rapid Transit Co., Brooklyn, N. Y., has been appointed superintendent of transportation of the company. Mr. Eagan succeeds John J. Dempsey, formerly vice-president and superintendent of transportation, recently resigned.

F. H. VAN GORDER, power apparatus specialist at the New York office of the Western Electric Co., has been appointed manager of the Newark store. Mr. Van Gorder entered the employ of the company in the spring of 1907 as a salesman connected with the Chicago branch. In 1914 he became sales manager of the Detroit store and in June, 1918, took up the duties of power apparatus specialist, which position he held until his recent promotion.

A. A. GUARDIA, sales manager of the Pelouze Manufacturing Co., Chicago, has recently been appointed general manager and assistant to the president of the company. Mr. Guardia has been associated with the company for 15 years, beginning as a salesman and in this capacity made hosts of friends in the industry. He has taken a prominent part in the activities of the electrical industry and for three years has served as statesman-at-large of the Jovian Order.

BERNARD J. DILLON, who for the past year has been on the staff of the ELECTRICAL REVIEW, has resigned to enter the advertising department of the Hurley Machine Co., Chicago, manufacturer of electric washing machines, vacuum cleaners and other household appliances. Mr. Dillon has given particular study to contracting-construction problems and the merchandising of electrical appliances, and his intimate knowledge of these subjects will prove of considerable value to the Hurley company. Mr. Dillon is a native of Pittsfield, Mass., where he served in the works of the General Electric Co. in transformer tests for about three years. In 1912 he came to Chicago and joined the Commonwealth Edison Co. For several years he was a district inspector, later becoming supervising inspector of this central-station company. Leaving the Edison company he became assistant editor of the ELECTRICAL REVIEW, taking charge of the Contractor-Dealer and Construction Departments. Mr. Dillon possesses a very pleasing personality, which has won for him many friends in this organization, and we trust this friendship will be established in the company with which he is now associated.

JOHN KELLY, who for a number of years was New York district manager of the Edison Storage Battery Co., has been appointed general sales manager of the company, with headquarters at Orange, N. J. This promotion for Mr. Kelly follows closely upon his promotion, on July 1 of this year, to the

John Kelly.

position of assistant general sales manager. Mr. Kelly brings to his new position the experience of a long and varied career in the storage battery, electric vehicle and accessory business. For nine and one-half years he was district manager of the New York office of the Edison Storage Battery Co. Prior to that time he had been a salesman for the Westinghouse Storage Battery Co. for two years, for the Swinehart Tire & Rubber Co. for three years, for the Firestone Tire & Rubber Co. for two years and for the New York Edison Co. for nearly four years.

W. D. A. PEASLEE, consulting engineer, and formerly assistant professor of electrical engineering at the Oregon Agricultural College, Corvallis, Ore., has become associated with the Jeffery-Dewitt Insulator Co., Huntington, W. Va. During the war Mr. Peaslee served with the Engineers in the trenches as liaison and reconnoissance officer with the rank of captain and later was on the staff of the First American Army as motor transportation officer, chief engineer. After the signing of the armistice Mr. Peaslee was appointed an executive officer of the information and liaison department of the American Peace Commission. He studied high voltage and ceramics in France and holds the degree of Deplome d' Etudes Superieurs from Sorbonne University, France. Mr. Peaslee has made extensive studies in high-voltage work and insulators, and his papers on this subject have been published in the A. I. E. E. Proceedings and other publications.

F. T. BANGS has left the advertising department of the Belden Manufacturing Co., Chicago, and rejoined the editorial staff of the ELECTRICAL REVIEW. Mr. Bangs is a graduate of Armour Institute of Technology course in electrical engineering, class of 1913. After spending three years in engineering work he joined the staff of the ELECTRICAL REVIEW, leaving a year and a half later to enter the advertising department of the George Cutter Co., South Bend, Ind., and last year that of the Belden Manufacturing Co.

PETER JUNKERSFELD, formerly assistant to the vice-president in charge of contract, operating, construction and electrical departments of Commonwealth Edison Co., Chicago, and now engineering manager for Stone & Webster, Boston, was recently the recipient of a Distinguished Service Medal presented by the Secretary of War in his office in Washington. The following quotation is taken from the citation: "By his unremitting industry and energy, sound judgment, and knowledge of men he was of the most material assistance in the accomplishment of the construction program of the Army. He performed notable service as executive, organizer, and administrator."

H. P. HARRSEN has been appointed general superintendent of the Michigan Railway Co., an interurban railway, Grand Rapids, Mich., succeeding C. E. Morgan, resigned. Mr. Harrsen is a native of St. Louis, attended the Washington university and served apprenticeship in St. Louis. He later went to northern Mexico as assistant engineer in an extensive electrical development, and subsequently removed to Mexico City to accept the appointment of secretary to the manager of the Mexico Street Railway Co. Resigning this position, he became associated with the Toledo Railways & Light Co., with whom he remained for eight years. He then returned to Mexico City as general superintendent and later as general manager of the street railway system, and also was general manager of an extensive chemical works controlled by a Canadian syndicate. This syndicate undertook extensive hydroelectric developments at Barcelona, Spain, and Mr. Harrsen was sent to Spain to take charge of the work. In Spain his health failed and he returned to America.

# For the Readjustment Period—What?

*LII.*

## We Must Have a Homogeneous People

### A Postal Zone Law Is a Menace to Our Nation

By CONGRESSMAN FRANK W. MONDELL of Montana

*I AM opposed to the zone system* for the dissemination of news, ideas and information because I am of the opinion that the establishment and maintenance of such a policy would, in the long run, have a most unfortunate, harmful and regrettable effect upon the American people.

If we are to maintain peace, order and justice under the institutions of free Government, within our borders, we must have a homogeneous people guided by the same principles and inspired by the same ideals. This condition essential to the maintenance of free government can only be secured by the widest possible circulation of those instruments and instrumentalities which inform, mold and affect public opinion.

Any policy which tends to make us provincial or parochial as a people, which tends to build up zones of influence and information, is a policy not only harmful but one that long continued and widely extended would prove fatal to free institutions. On the other hand, a policy which makes equally available to the people in all parts of the country the journals and magazines which convey information, carry current argument, analysis and entertainment, tends to maintain those conditions essential to our institutions.

Those whose views or arguments for the zone system are based primarily or largely on its effect, or alleged effect, on postal revenues, or the profits of the publishing business, fail utterly to grasp or realize the larger and infinitely more important aspects of postal systems as they affect the national life. If it be a fact that the flat postal rate on newspapers and magazines has been unduly low, that is a matter for consideration by the Post Office Committee, having in view the traditional policy of the American people. The fact that some people have been able to make a considerable amount of money in the newspaper and magazine business is, of course, one of the matters that a committee would consider in this connection, but it is by no means conclusive that a policy is wrong because some people have been able to make money under it—many having the same opportunities and privileges have failed utterly.

The demand for the establishment and maintenance of a zone system is particularly lame and illogical when it is made by those who are urging a flat rate of one cent on letters. Such people to be logical should insist upon a zone rate for letters as well as papers and periodicals. Neither is the argument for a zone system strengthened by exaggerated statements of losses to the postal revenues under a flat rate. Undoubtedly the former flat rate did not wholly reimburse the postal revenues but the most superficial examination of the matter renders ridiculous exaggerated statements of alleged losses.

I have neither urged nor considered this as a party question. It involves a national principle affecting every man, woman and child in the Republic, and has never been considered in a partisan way by anyone so far as I know. I urged this repeal before the previous Democratic Congress, as I shall before the present Republican Congress—not on party or partisan grounds, but on the broad platform that such a policy tends to circumscribe and provincialize our national life to our great haven as a people.

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In this era of Reconstruction, anything which tends to restrict trade or technical information to zones is a serious detriment to progress. It is not so much the publisher's problem as it is yours.

C. A. TUPPER,
President International Trade Press, Inc.

# Financial News

## State Owned Utilities.

The following editorial is quoted from the Renville (Minn.) Star-Farmer:

"People of the present day are not so much different than they were when the western country was first being settled nearly a century ago. They were at that time led to believe that state ownership of public utilities was the one thing needful to give them conveniences required in opening up the country. They voted bonds for railroads in large amounts, banks, manufacturing, in fact history states the people had a regular mania for public owned utilities. But as is usually the case they neglected to count the cost of practical operation. Politics would get mixed up in the transaction and in the case of a proposed railroad the bonds would be voted, yet there was never any more than an initial step taken in the building of the road. Eventually it went into private hands before it was built and the bonds were still outstanding and had to be paid or repudiated. In those days it was hard to get a stable currency. There were wildcat banks galore, and fabulous sums of money were lost through them. A farmer would take a load of wheat to market, receiving around 50 cts. a bushel for it, and was paid in bank notes. To be safe he would be obliged to spend it all before he arrived home or perhaps the next time he went to town the bank would be out of business and its notes worthless. To show how little faith the government had in that kind of financing it demanded gold in the payment of taxes. Compare those times with the present and you will not fail to note the difference. There is prosperity on every hand. To be sure everyone is not a millionaire, but as a rule the people of Minnesota are fairly well to do, living under our present laws. State owned utilities is the dream of the socialist. It does not mean just a few things, as may be stated at the start, but it means every industry shall come under state control. Our present system of operation of the utilities may be and doubtless is not of the best, but it would be the part of wisdom to improve what we have rather than to pattern after something so radical that it would upset our theory of government entirely. It is best to make haste slowly in these matters."

## Brazilian Traction Annual Statement.

The annual statement of the Brazilian Traction, Light & Power Co. for 1918 shows that the net revenue was higher than in 1917. Last year showed $5,419,672, compared with $5,266,518 in 1917. The net earnings were $13,236,223, compared with $11,693,988 in the preceding year. The total assets are shown to be $230,503,576, and the floating assets $13,202,989, compared with floating liabilities of $10,025,836. The profit and loss balance at the end of the year was $7,613,041, compared with $8,043,368 at the end of the preceding year.

A note issue of $7,500,000 is due on Nov. 1 next, but it is stated this will be renewed unless financial conditions permit the sale prior to that date of the Rio and Sao Paulo Telephone bonds held as collateral to the notes. The board is unable to state when dividends on the common stock will be resumed. Surplus revenue must be applied for the present to capital expenditure account, until government restrictions on new capital issues are removed and conditions are more settled.

## West Virginia Traction Bond Auction Sale.

Default having been made in the payment at maturity on May 1, 1919, of the West Virginia Traction & Electric Co.'s $1,800,000 two year 6% bond secured notes, the New York Trust Co. as trustees will, on Sept. 3, sell at public auction the collateral pledged under the notes, namely, one temporary bond representing $2,500,000 principal amount of general and refunding mortgage, 25 year 5% goid bonds of the traction company. In payment thereof any of the two year 6% bond secured gold notes will be accepted at the sale in lieu of cash to the amount which shall upon distribution of the net proceeds of such sale be payable thereon.

## Excelsior Electric Dairy Machinery Capitalization.

The Excelsior Electric Dairy Machinery, Ltd., Toronto, has been granted letters patent under the Ontario Companies to take over the present business of the Excelsior Electric Manufacturing Co. and the Excelsior Electric, Ltd. The company, which has an authorized capitalization of $100,000, will manufacture and deal in electric motors, machinery and equipment of all kinds.

An interim balance statement and revenue account submitted to the city council by the Toronto Hydroelectric System for the half year ending June 30, shows a total income of $1,193,054.81. The expenditures are as follows: Electric current, $327,771.71; expenses of operation, management, repairs, etc., $346,082.09, a total of $675,859.80, leaving $519,195.01 as net income from operations for the period. This has been applied as follows: Interest, $204,295 54; sinking fund, $79,276.17; balance for depreciation and adjustments, $235,623.72. The total revenue of $1,193,054.81 compares with $1,157,108.44 for the corresponding period in 1918. The balance for depreciation and adjustment last year was $154,663.36.

## Milwaukee Electric Co. Income Decreases.

In its monthly report to the Railroad Commission of operating revenues and expenses for July, and for the year ended July 31, 1919, the Milwaukee Light, Heat & Traction Co. shows that during the year in which it has operated under a city fare of 5 cents, it has failed by $540,074.58 of earning the 7½% on its capital.

This report, issued monthly, in accordance with the commission's order of April 4, 1918, further shows that for July net operating revenues for the city and suburban lines was $54,407.74, as against the estimate of the commission that it would be $107,972.51, or approximately one-half the estimate. For that month the cost of way and structures maintenance was 3.55 cents per car mile, as against the commission's estimate of 1.73 cents per car mile, and the maintenance of equipment cost was 3.25 cents per car mile as against the estimate of 2.44 cents.

For the seven months ended July 31, net operating revenues were $372,678.69, against an estimate by the commission of $755,807.61, or only 2.15% on the capital, as against the estimate of 4.04%. The way and structures estimate for this period was 2.55 per car mile, as against the commission's estimate of 1.73 cents, and the equipment maintenance was 3.80 cents per car mile against the estimate of 2.44 cents. Figures for the year, ended July 31, show that the return on the capital allowed by the commission was only 3.27%, instead of the contemplated 7½%.

Allis-Chalmers Manufacturing Co. has declared a quarterly dividend of 2½%, payable Oct. 15 to stock of record Sept. 30.

Electric Storage Battery Co. has declared a quarterly dividend of 2% on common stock, also a quarterly dividend of 2% on preferred stock, both payable Oct. 1 to stock of record Sept. 15.

Utilities Securities Corp. has declared a dividend of 1¾% on preferred stock, payable Sept. 27 to stock of record Sept. 17.

The board of directors of the Consolidated Gas, Electric Light & Power Co. has declared a quarterly dividend of 2% on common stock, payable Oct. 1 to stock of record Sept. 15.

WEEKLY COMPARISON OF CLOSING-BID PRICES OF SECURITIES OF LEADING ELECTRICAL COMPANIES.

Quotations furnished by F. M. Zeiler & Co., Rookery Bldg., Chicago.

| Public Utilities. | Div. rate. Per cent. | Bid Sept. 9. | Bid Sept. 16. |
|---|---|---|---|
| Adirondack Electric Power of Glens Falls, common | 6 | 14 | 14 |
| Adirondack Electric Power of Glens Falls, preferred | 6 | 77 | 77 |
| American Gas & Electric of New York, common | 10+extra | 120 | 120 |
| American Gas & Electric of New York, preferred | 6 | 40 | 40 |
| American Light & Traction of New York, common | .. | 225 | 230 |
| American Light & Traction of New York, preferred | 6 | 93 | 94 |
| American Power & Light of New York, common | 4 | .. | .. |
| American Power & Light of New York, preferred | 6 | .. | .. |
| American Public Utilities of Grand Rapids, common | .. | 5 | 5 |
| American Public Utilities of Grand Rapids, preferred | 7 | 24 | 24 |
| American Telephone & Telegraph of New York | .. | .. | 101⅜ |
| American Water Works & Elec. of New York, common | .. | 5 | 5 |
| American Water Works & Elec. of New York, particip. | 7 | 10 | 10 |
| American Water Works & Elec. of New York, first preferred | .. | 56 | 57 |
| Appalachian Power, common | .. | 4 | 4 |
| Appalachian Power, preferred | 7 | 22 | 22 |
| Cities Service of New York, common | +extra | 475 | 483 |
| Cities Service of New York, preferred | 6 | 78 | 77¾ |
| Commonwealth Edison of Chicago | 8 | 108½ | 110 |
| Comm. Power, Railway & Light of Jackson, common | .. | 22 | 22 |
| Comm. Power, Railway & Light of Jackson, preferred | 6 | 45 | 45 |
| Federal Light & Traction of New York, common | .. | 10 | 9 |
| Federal Light & Traction of New York, preferred | .. | 47 | 47 |
| Illinois Northern Utilities of Dixon | 6 | 78 | 78 |
| Middle West Utilities of Chicago, common | 2+extra | 30 | 30 |
| Middle West Utilities of Chicago, preferred | 6 | 50 | 50 |
| Northern States Power of Chicago, common | .. | 66 | 65½ |
| Northern States Power of Chicago, preferred | ex.div.7 | 96 | 90 |
| Pacific Gas & Electric of San Francisco, common | .. | 68 | 67½ |
| Pacific Gas & Electric of San Francisco, preferred | 6 | 88 | 88 |
| Public Service of Northern Illinois, Chicago, common | 7 | 83 | 83 |
| Public Service of Northern Illinois, Chicago, preferred | 6 | 90 | 90 |
| Republic Railway & Light of Youngstown, common | 4 | 10 | 10 |
| Republic Railway & Light of Youngstown, preferred | 6 | 45 | 45 |
| Standard Gas & Electric of Chicago, common | .. | 34 | 34 |
| Standard Gas & Electric of Chicago, preferred | 8 | 42 | 41½ |
| Tennessee Railway, Light & Power of Chattanooga, common | .. | 4 | 4 |
| Tennessee Railway, Light & Power of Chattanooga, preferred | 6 | 13 | 13 |
| United Light & Railways of Grand Rapids, common | 4 | 43 | 42 |
| United Light & Railways of Grand Rapids, preferred | 6 | 71 | 70 |
| Western Power of San Francisco, common | .. | 24 | 24 |
| Western Union Telegraph of New York | extra | 83½ | 85⅛ |
| **Industries.** | | | |
| Electric Storage of Philadelphia, common | 4 | .. | 97 |
| General Electric of Schenectady | 8 | 168 | 168½ |
| Westinghouse Electric & Mfg. of Pittsburgh, common | 7 | 55 | 54¾ |